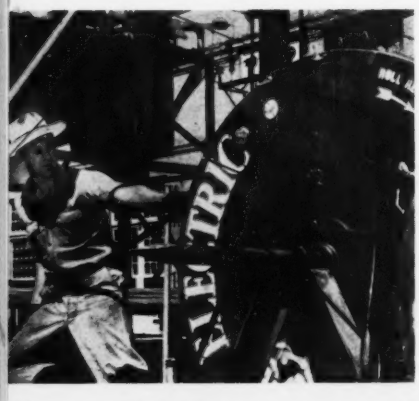
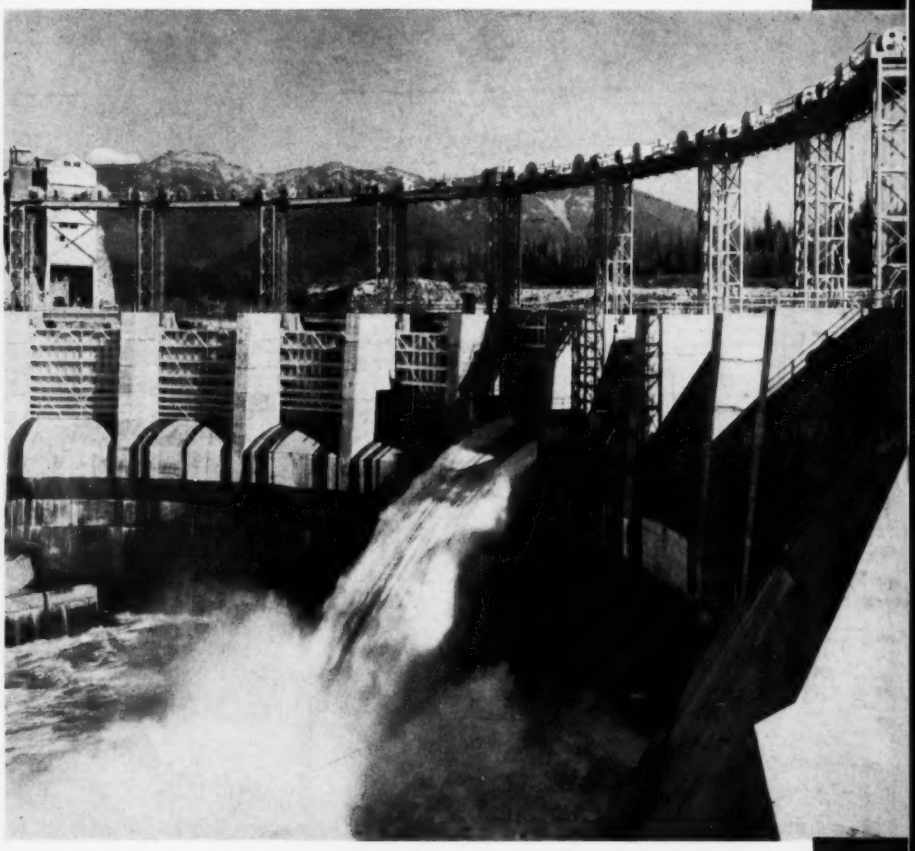
ELECTRICAL WEST

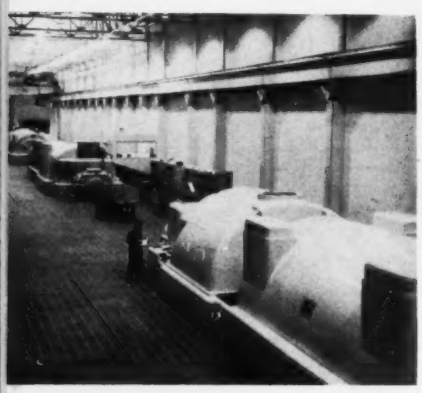
February 1953
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.



Heave Ho, Say Utilities..... 90





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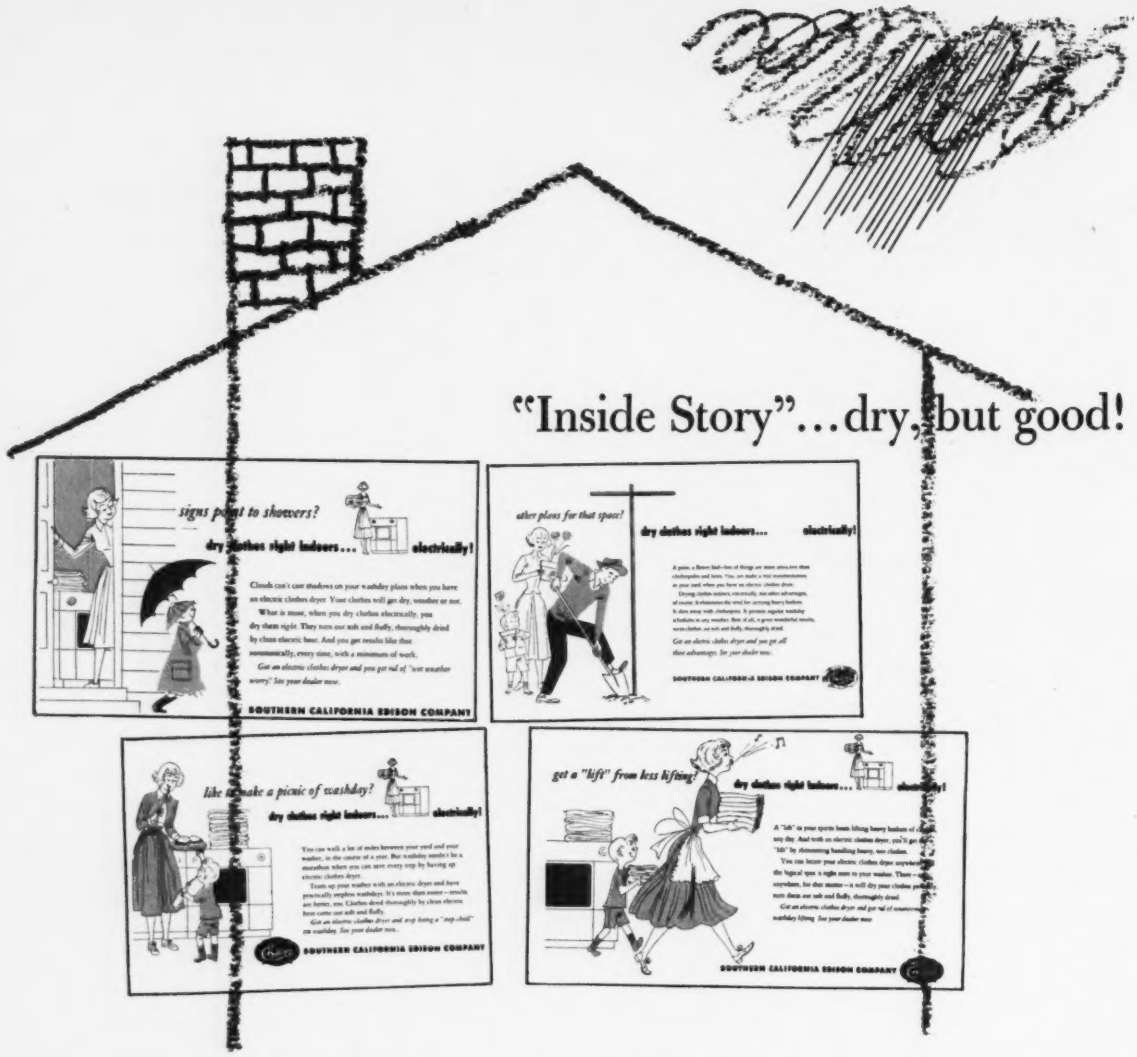
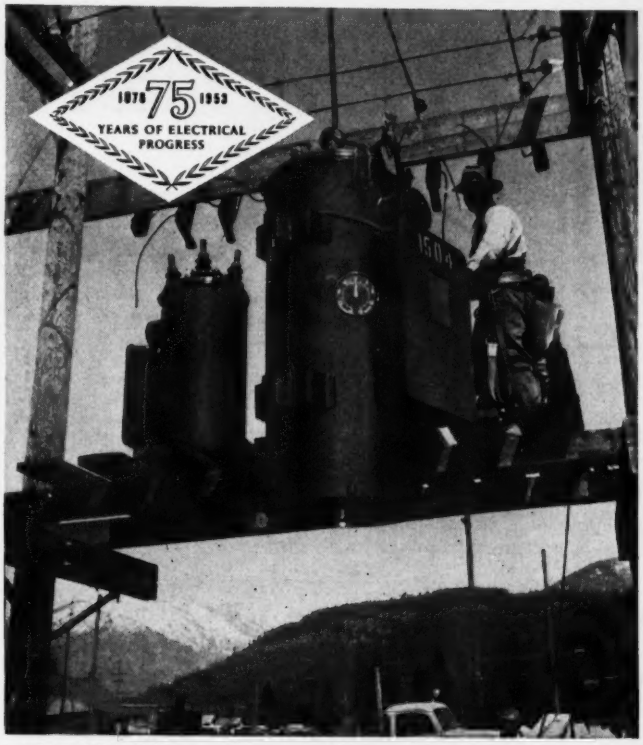

"Inside Story"...dry, but good!
signs point to showers?
dry clothes right indoors... electrically!
Clouds can't cast shadows on your washday plans when you have an electric clothes dryer. Your clothes will get dry, weather or not.
What is more, when you dry clothes electrically, you dry them right. They turn out soft and fluffy, thoroughly dried by clean electric heat. And you get results like that automatically, every time, with a minimum of work.
Get an electric clothes dryer and you get rid of "wet weather worry." See your dealer now.
SOUTHERN CALIFORNIA EDISON COMPANY
other plans for that space?
dry clothes right indoors... electrically!
SOUTHERN CALIFORNIA EDISON COMPANY
like to make a picnic of washday?
dry clothes right indoors... electrically!
SOUTHERN CALIFORNIA EDISON COMPANY
get a "lift" from less lifting?
dry clothes right indoors...
SOUTHERN CALIFORNIA EDISON COMPANY

Even its staunchest boosters will admit that the weather in Central and Southern California is less good at some times than at others! And it's especially noticeable when it comes to jobs like drying clothes.

Surely seasonal, then, are these "rainy season" Edison advertisements on electric clothes dryers. They point out that drying clothes indoors has several advantages. Just as important, they stress that drying them *electrically* gives best results.

Edison's "inside story" has a moral, too: See your dealer. It's another story which follows the successful story formula: "*Edison tells them, and the dealer sells them!*"

Southern California Edison Company



BETTER VOLTAGE will be supplied to customers of the Mountain States Power Co. because of the small voltage steps of the ML32's shown here being installed in the Sandpoint, Idaho, area.

Set new voltage standards on your branch and rural circuits

New G-E 32-step regulator features Class 1 accuracy, ±10% regulation, improved switching... at no extra cost

General Electric's new ML32 single-phase voltage regulator costs no more than the ML8 it supersedes. Yet its wider range, closer regulation and smaller steps permit you to set new standards of service on your branch and rural feeders.

The new ML32 offers 20% regulation—10% raise and 10% lower in thirty-two 5/8% steps. Its controls meet rigid ASA Standards for Class 1 accuracy—99% accuracy regardless of operating changes in temperature, frequency or load. And its improved switching mechanism makes tap changes at optimum speed to assure long contact life and a minimum of maintenance.

G-E ML32 step voltage regulators can be obtained for 2500, 5000, 6900, 7200, 7600, and 7960-volt single-phase feeders and the corresponding wye voltages. For complete information, see your local G-E Sales representative. Or write for bulletin GEA-5752, General Electric Co., Schenectady 5, New York. 423-1

OPTIONAL MOUNTING of controls at base of pole—an additional feature of the new G-E ML32—facilitates inspection and adjustment. Note modernized control panel with all control knobs conveniently located.

There's a G-E voltage regulator for every application

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

FEBRUARY 1953

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-fifth year of publication

VOL. 110 NO. 2

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Associate Editor — John Coetz, Typography

Next Month

A real treat is coming up for March in the form of a feature article on cloud seeding. Artificial rain making has been in the news in recent years and several utilities on the West Coast are actually engaged in cloud seeding this winter to increase snow pack. The story will be told from theory to practice by a man exceptionally versed in the whole subject.

One of the large utilities has instituted a program of driver's tests for operating automotive equipment. Results are positive and it will make a good article for the March issue.

Short-cut methods used by the Southern California Edison Co. in straightening the shaft of a large turbine-generator that single-phased will make interesting reading to those involved in the maintenance of large apparatus.

Two good articles on industrial heating are scheduled. One tells how electronic gluing solved a production problem in making plastic television cabinets; the other has to do with an electric carriage drive for sawmills.

In the way of new industrial techniques comes a short-cut method of printing. It is an electronic process wherein a high-voltage d-c field is used to precipitate fine particles on a plate to form type. Much as a Precipitron works.

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34th Annual Review and Forecast

Another Year of Expansion Ahead **87**

A sustained high level of construction in all categories is indicated from all forecasts for 1953.

Western Utilities Maintain Pace of 1952 ..... **90**

Total budgeted for new plant by all utility agencies for 1953 is three-quarters of a billion to maintain record pace set in 1951-52. New generation this year is set at 1,686,884 kw.

How to Visualize the West's 1953 Market Opportunity ..**124**

A quick way to grasp the amount of business for the industry that will develop from the year's new generating capacity, and some of the measures by which to predict.

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Cover photos: Cabinet Gorge Dam, Washington Water Power Co.; Cable for Utah Power & Light Co. construction; fourth 50,000-kw generator at San Diego G&E's Silver Gate plant; A-W certificate awarded, Provo, Utah, Department of Utilities

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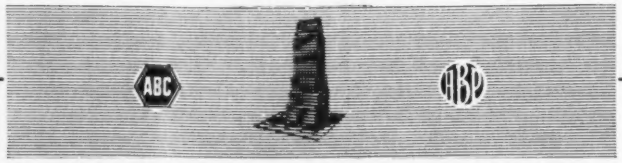
San Francisco (4) ..... **Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600**



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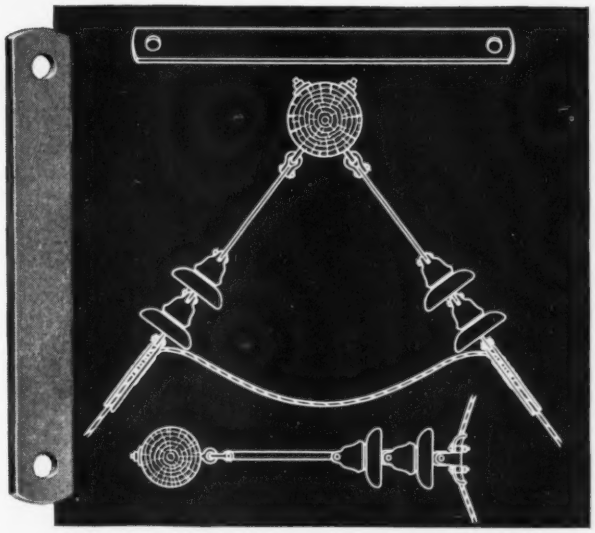
LINE CONSTRUCTION BLUEPRINTS

HOW SOME UTILITIES ARE MAKING CONSTRUCTION WORK EASIER . . .
IN WAYS THAT MAY BE HELPFUL AND USEFUL TO YOU.

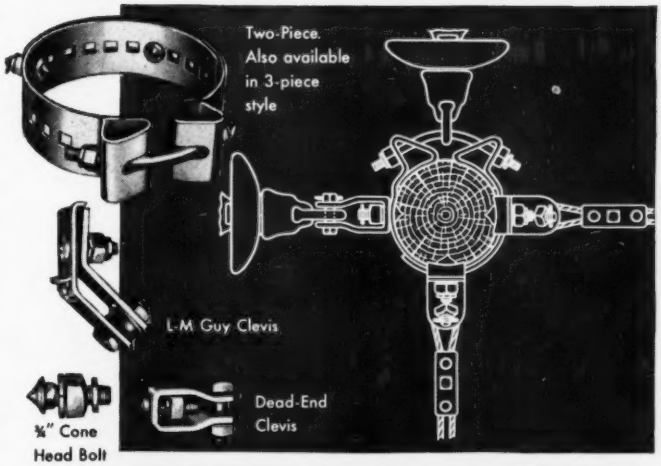
L-M EXTENSION LINKS

For safety reasons, more and more extension links are being used to obtain greater clearance from pole or crossarm to the insulators at primary dead ends. The links are attached to the wood member with an eye bolt and shackle. L-M extension links are available in a wide variety of sizes to meet any desired application.



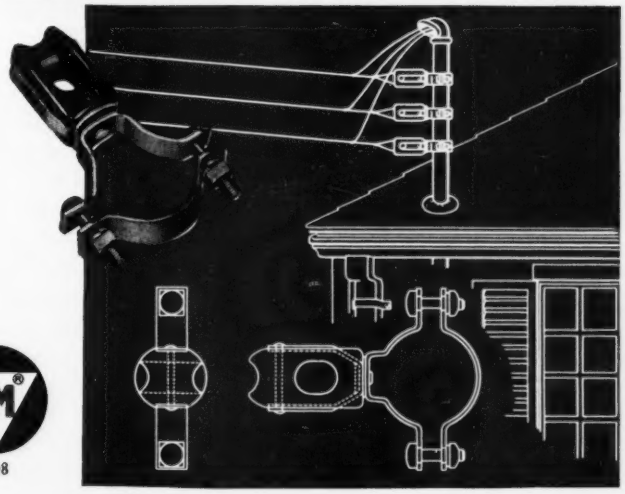
L-M POLE BAND and ATTACHMENTS

An improved galvanized steel (3/16″ x 3″) pole band for guying and dead ending. One of the advantages of this style band is that dead ends and guys may be attached at many different angles. Even under extreme load its strength does not depend on the strength of the welds. Two sizes, adjustable for 6 to 10 inch poles, and 8 to 15 inch poles. Choice of fittings. The ¾ inch curved bolt also can be used for attaching dead end fittings.



HANDY SERVICE ENTRANCE BRACKET FOR LOW-ROOF RANCH HOUSES

To assure required clearance for service drop wires on low ranch houses, the service entrance conduit frequently extends above the eaves of the roof. When 2″ or 2½″ conduit is used as a mast in this type of installation, this bracket provides a sturdy yet inexpensive method for dead ending the service drops. Catalog Number BPA43E1.



Do you have a line construction problem? These are just a few of thousands of L-M line construction specialties. If you have a line construction problem, let us know. We may have standard or special items in stock that will solve it. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL

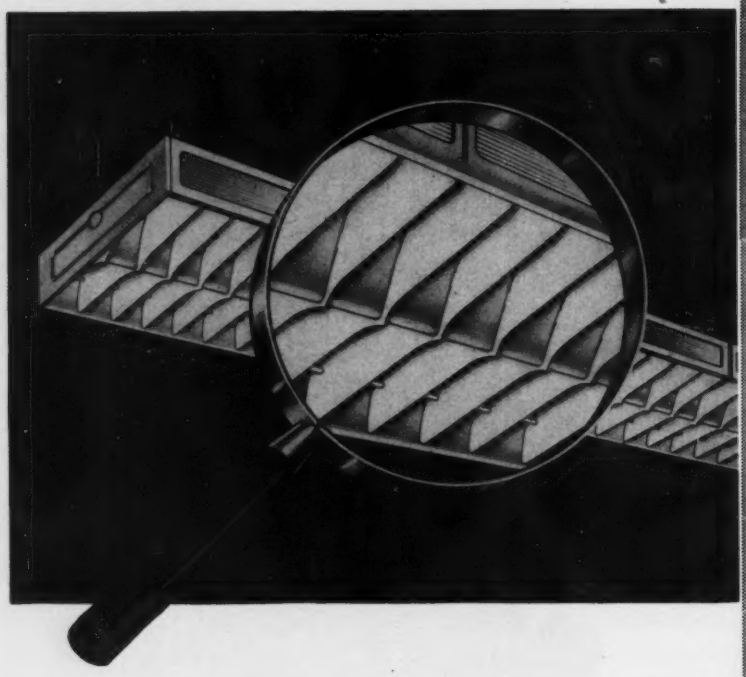
Line Construction Materials

Complete Coordinated Equipment for Distribution Today

Day-Brite "Close-Up" Quality

MAKES YOUR PROFITS SAFE

because it makes satisfied customers



THIS IS A CLOSE-UP of the *interlocking louver* feature of Day-Brite's PLEXOLINE ® fixtures. Each cross-wise louver is firmly locked into the center "V" louver and is tied at both ends by a steel rod. The whole shielding unit is rigid. It won't sag. It won't rattle. Louvers will not twist or bend out of shape during installation or when the fixture is being cleaned or relamped.

THIS "CLOSE-UP" QUALITY FEATURE is important to you because it helps make installation easier, faster and more profitable. It means *safer profits* through elimination of costly, time-consuming "call-backs."

311

YOU'LL FIND THE DAY-BRITE REPRESENTATIVE IN YOUR AREA HELPFUL AND COOPERATIVE

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J. H. Brundage
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* * *

Day-Brite Lighting, Inc., 5412 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

SPANGLEAM—an all new product, inside and outside!

Inside: Wire pulling easier than ever with the new smoother, protective coating of resinous lacquer compounded with Zirconium. Corrosion resistance *plus* assured grounding.

Outside: Electrogalvanized exterior specially processed for this smart, new finish. Where conduit must be installed in exposed locations, SPANGLEAM presents a neat, attractive appearance. SPANGLEAM is highly resistant to smudge, abrasion and corrosion.

SPANGLEAM—tops in the field!

- easier to cut
- easier to bend
- faster to install
- cleaner
- lightweight
- strong
- permanent

SPANGLEAM—available immediately in the full range of six sizes:

½", ¾", 1", 1¼", 1½", and 2"

Find out how **SPANGLEAM** can help you—

- give you a better installation
- make your work easier
- build profits

See your distributor . . . he has **SPANGLEAM** *in stock.*

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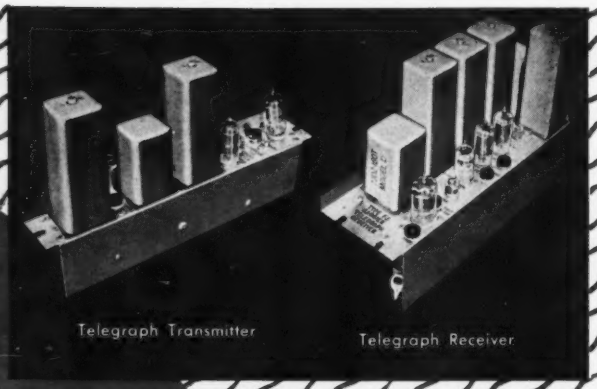
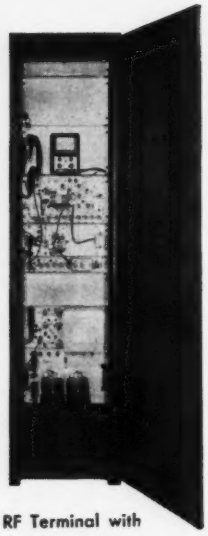


Telegraph Transmitter

Telegraph Receiver



RF Terminal with Service Channel

Complete Voice Band panel with signalling, termination and power supply

ANNOUNCING

THE NEW WESTINGHOUSE

2000 MC MICROWAVE SYSTEM

FOR:
- ✻TELEMETERING
- ✻VOICE COMMUNICATION
- ✻LOAD CONTROL
- ✻TELETYPE
- ✻REMOTE CONTROL
- ✻SUPERVISORY CONTROL
- ✻PROTECTIVE RELAYING
- ✻FACSIMILE TRANSMISSION

Whatever your communication needs may be, examine the new type FR Microwave radio and type FJ Multiplexing equipment.

Maximum transmission reliability plus compatibility with interconnected terminal equipment assures a dependable, trouble-free communication system.

Long experience in microwave equipment and design, and a thorough knowledge of your problems, have enabled Westinghouse to combine the best development of past and present systems in this new equipment. To meet all your communication requirements, Westinghouse offers these important plusses:

1. VERSATILE, WELL-INTEGRATED PACKAGE—The multiplexing equipment is designed specifically for operation with the radio equipment and with end equipment to insure a versatile, well-integrated package.

2. UP TO 30 VOICE CHANNELS—The type FR and FJ equipment provides 30 voice channels plus a service channel to satisfy all your communication requirements. Each voice channel may be used for up to 15 telegraphic functions.

3. MAXIMUM TRANSMISSION RELIABILITY—Operation at 2000 MC with ample reserve power assures dependable transmission under all conditions.

4. COMPLETE INDEPENDENCE OF INDIVIDUAL CHANNELS—Self-contained voice channel multiplexing equipment provides unmatched reliability of the individual functions. Only the radio equipment is common to all channels.

A COMPLETE SYSTEM: What's more, Westinghouse can deliver a complete Microwave communication system to you on a turn-key basis. All phases of design and construction, including surveys, installation, equipment, buildings and towers can be supplied.

Extensive Westinghouse facilities and experience as a manufacturer of all types of supervisory control, telemetering and relaying equipment make it possible to bring you a really complete, integrated system under a single responsibility.

If you are considering new or expanded communications, it will pay you to examine Westinghouse microwave radio. For complete information, call your nearest Westinghouse representative, or write at once to Westinghouse Electric Corporation, Carrier-Microwave Section, 2519 Wilkens Avenue, Baltimore 3, Maryland.

J-02253

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THE EV

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EXTRA!

Insulation Stamina

with

ANHYDREX XX

Where your operations demand exceptional resistance to moisture, ozone, heat, and aging, ANHYDREX XX has the extra insulation stamina that means longer-life and trouble-free service. ANHYDREX XX specially compounded insulation will give you uninterrupted service year in and year out at 2,000-17,000 volts in underground, duct, or aerial installations.

Our research engineers aged ANHYDREX XX for sixteen weeks under the grueling temperature of 250°F. (121°C). ANHYDREX XX retained its excellent electrical properties as well as its rubber-like characteristics. We subjected a vegetable oil compound to the same test and after only one week it lost its rubber-like characteristics. A heat-resistant compound had the same result after three weeks of testing. Both compounds became brittle and when bent cracked and crumbled. There is no better proof anywhere that ANHYDREX XX is tops in high voltage insulation.

The next time you need high voltage cables be sure to specify ANHYDREX XX for economy, quality, and satisfaction. ANHYDREX XX Insulated Cables offer the kind of performance that reduces maintenance and replacement costs. For more complete information about what ANHYDREX XX will do for you, contact your nearest Simplex representative or write in care of the address below.

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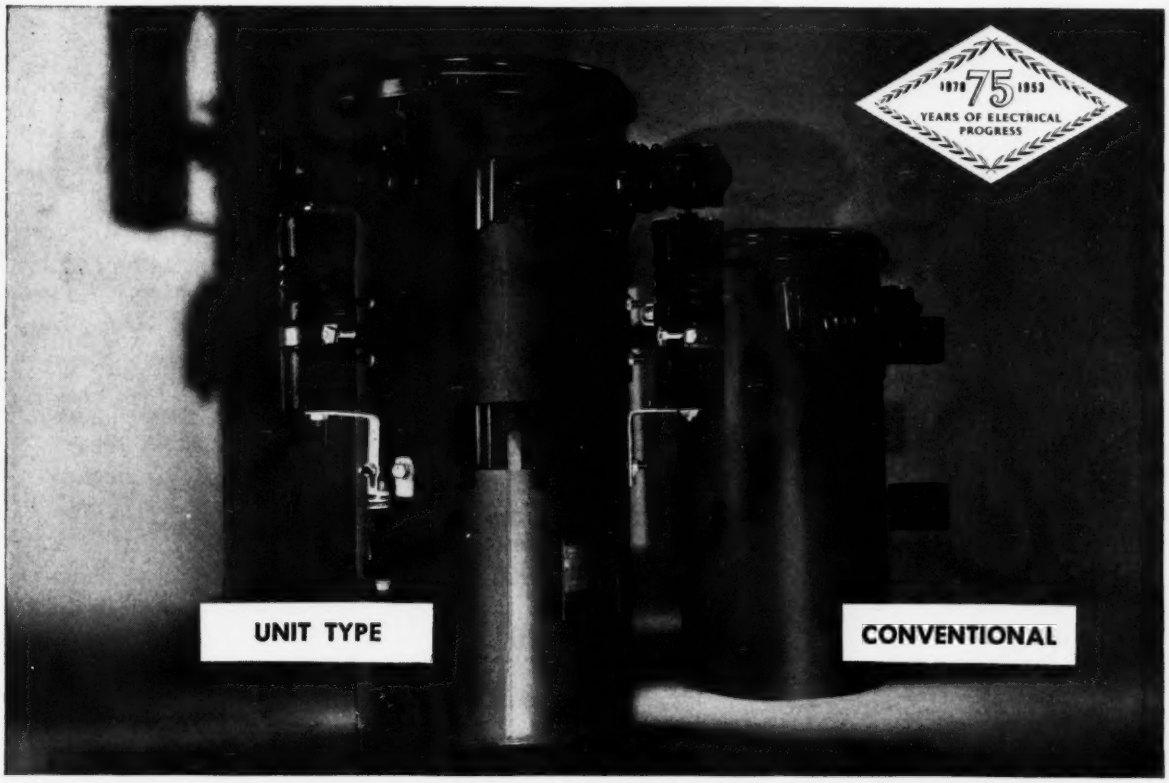
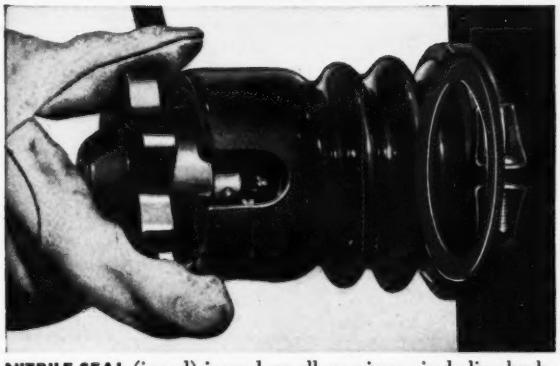
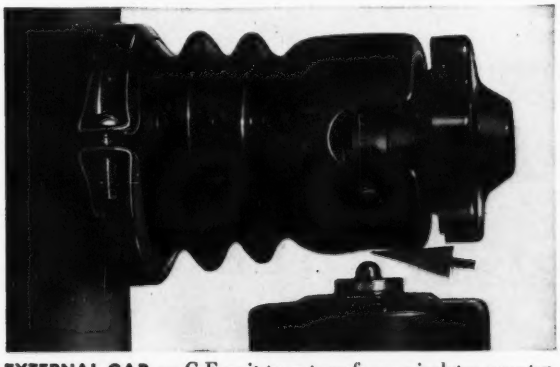




NITRILE SEAL (in red) is used on all openings—including bushings—to prevent breathing. An extra feature is non-rustable stainless steel band and Everdur bolt which clamp bushing to tank.



EXTERNAL GAP on G-E unit-type transformer isolates arrester from high-voltage lead. The gap keeps arrester at ground potential and prevents line grounding in event of arrester damage.

Easier to Connect Better Protected

New tank-wall high-voltage bushings on General Electric transformers—both conventional and unit type—make them easier to install. They permit faster, safer connections—without tools. Cable can be brought in from either side of the bushings, tightened quickly.

EXTERNAL GAP PROTECTS. On G-E unit-type transformers, the Pellet arrester is externally gapped to the new tank-wall bushing. This gap keeps the arrester at ground potential and prevents line grounding in case of arrester damage. And because the Pellet arrester is of the valve type which can't be eroded by discharge, it offers protection that lasts indefinitely. It can be installed anywhere on your system regardless of short-circuit currents.

Many ratings of these Spirakore* transformers with tank-wall high-voltage bushings can be shipped directly from one of G.E.'s warehouses near your locality. They're available in ratings 5 kv and below, 100 kva and below. For more information get in touch with your nearest General Electric representative. General Electric Company, Schenectady 5, New York. 431-2

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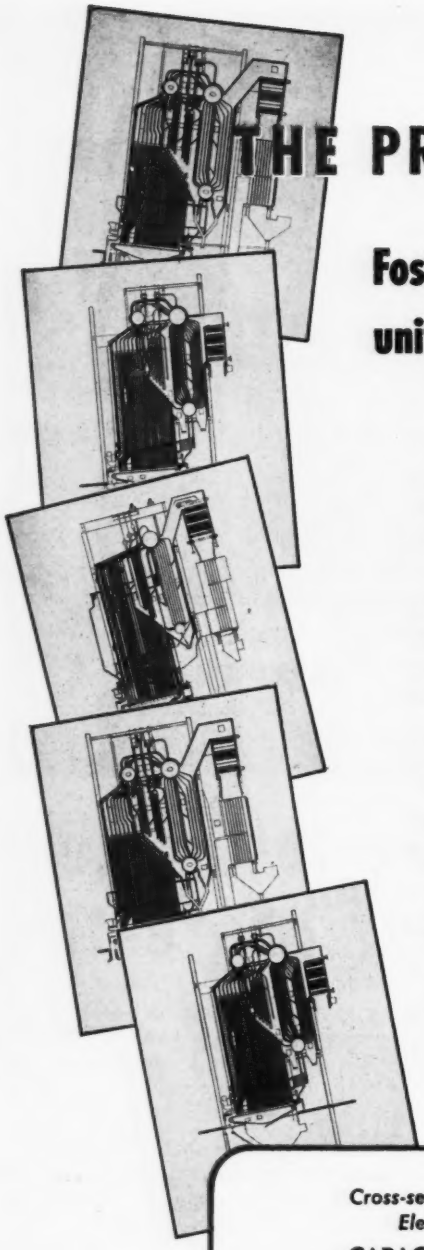
GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.



THE PROOF OF SATISFACTION

Foster Wheeler installs 18 spreader-stoker units for six customers!

The surest proof of customer satisfaction for any product is a repeat order. And on major equipment, such as steam generators, customer acceptance means satisfaction from planning through actual operation.

That's why Foster Wheeler is proud of this record of repeat installations of versatile spreader-stoker-fired units with their capability of burning a wide variety of bituminous coals. Installations up to 325,000 lbs per hour have been made for:

CENTRAL ILLINOIS ELECTRIC and GAS CO.	5 UNITS
CENTRAL IOWA POWER COOPERATIVE	2 UNITS
MONSANTO CHEMICAL CO.	4 UNITS
NORTHERN STATES POWER CO.	2 UNITS
STUDEBAKER CORPORATION	3 UNITS
WEST VIRGINIA PULP and PAPER CO.	2 UNITS

These installations are another example of Foster Wheeler's ability to design, engineer, fabricate and construct power-producing equipment to meet your needs.

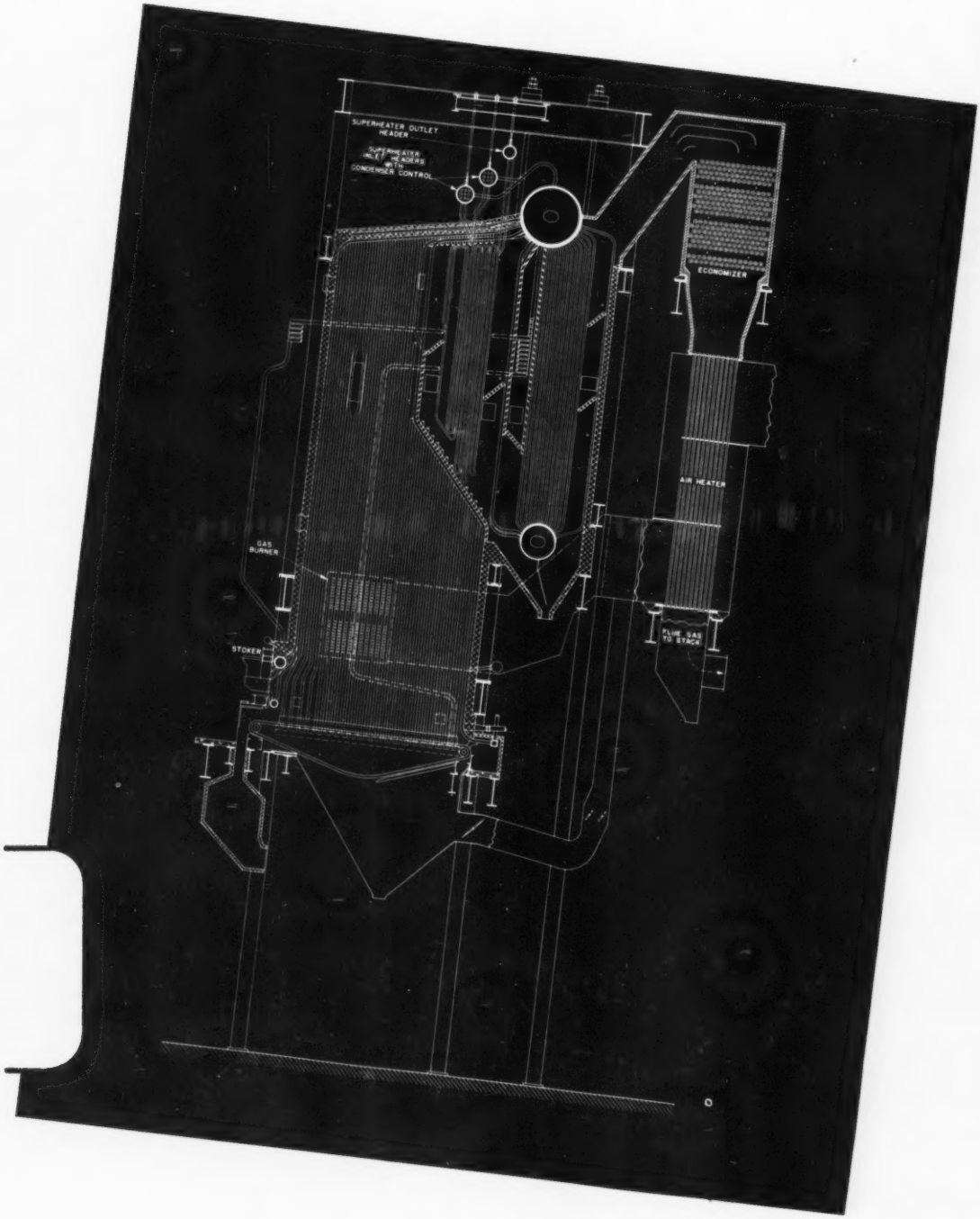
Cross-section of latest stoker-fired steam generator designed for Central Illinois Electric and Gas Co., Sabrooke Generating Station, Rockford, Illinois.

CAPACITY	300,000 lb per hr
PRESSURE	950 psig
FINAL STEAM TEMPERATURE	875 F
FEED TEMPERATURE	350 F

FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

...REPEAT ORDERS!



Coupling Conduit? it's easy...

with an O.Z. Split Coupling

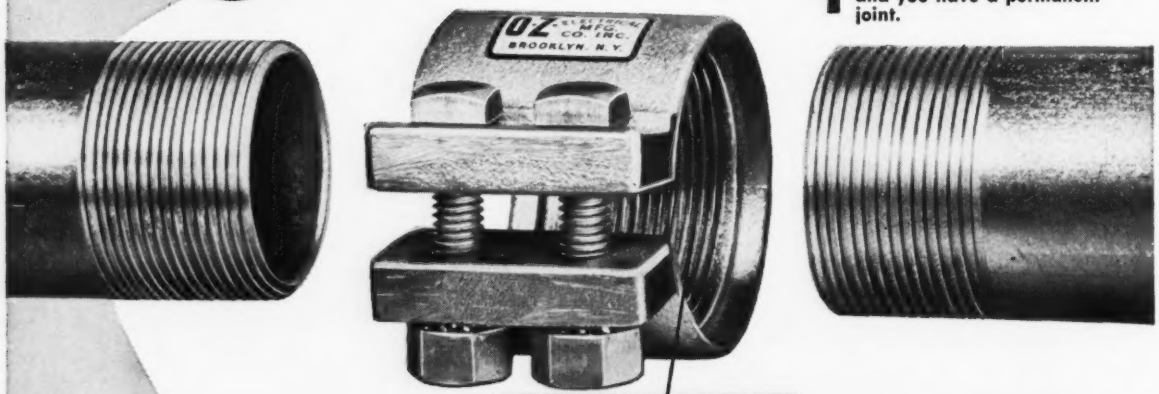
UL Approved

THESE YOUR PROBLEMS?

Not enough space
No room for wrench
Hard to get at
Conduits can't be turned

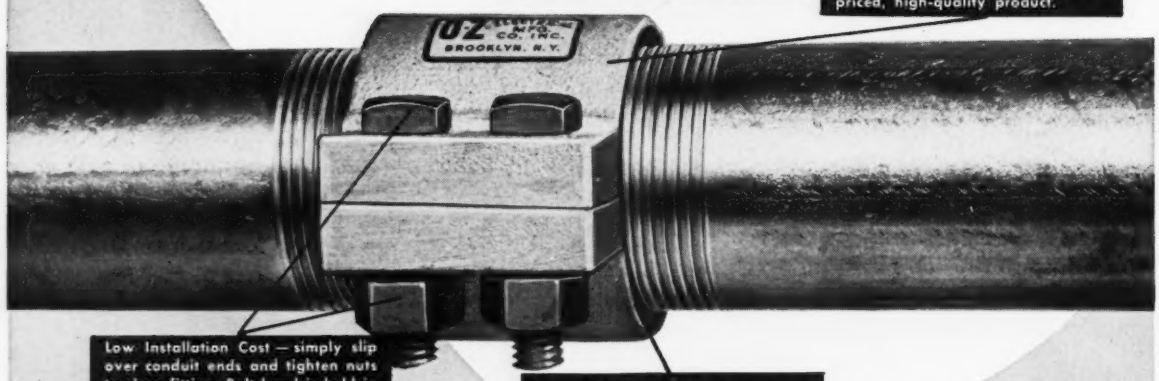
HERE'S YOUR ANSWER!

O. Z. is the simple, dependable way to couple conduit. Just butt the conduit ends within the opened O. Z. Split Coupling, tighten two nuts and you have a permanent joint.



Interior Threading — meshes with conduit threading for a rigid close-fitting connection.

Low Price — simple, one-piece malleable iron construction assures low-priced, high-quality product.



Low Installation Cost — simply slip over conduit ends and tighten nuts to close fitting. Bolt head is held in place by coupling shoulder.

Available for conduit sizes ranging from ½" to 5".

8192

O.Z. ELECTRICAL MANUFACTURING COMPANY, INC.
262 BOND STREET · BROOKLYN 2, N. Y.

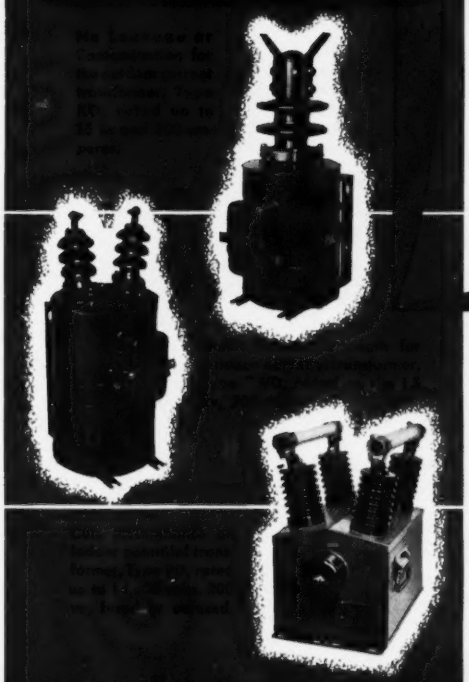
Your local O. Z. distributor is ready *now* to serve you from stock. Get in touch with him for further information on the complete, dependable O. Z. line of electrical fittings.

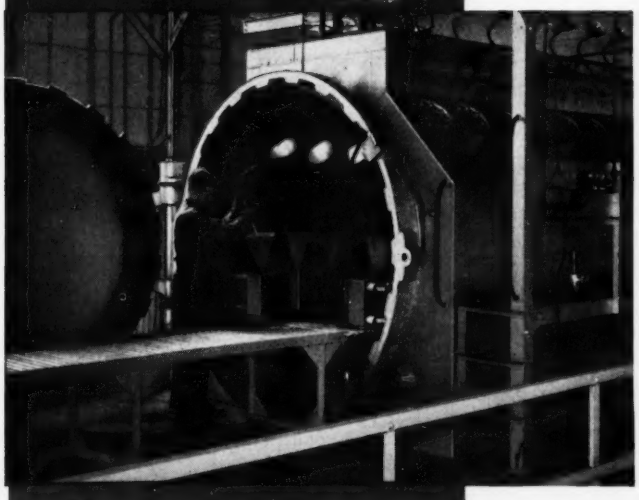
CONDUIT FITTINGS · CABLE TERMINATORS · GROUNDING DEVICES
CAST IRON BOXES · SOLDERLESS CONNECTORS · POWER CONNECTORS

INSTRUMENT TRANSFORMERS

no leaks or contamination

with this Vacuum-Pressure Process





Allis-Chalmers Vacuum-Pressure System for Compound Filling Instrument Transformers Boosts Safety Factor and Virtually Eliminates Maintenance.

HERE'S AN ALLIS-CHALMERS "extra" that can save you money every day and add years of service to your instrument transformer.

It's the modern A-C vacuum-pressure solid-compound process. In addition to locking out air and moisture, it practically does away with transformer maintenance.

Shown below, the vacuum-pressure chamber does two "life-prolonging" jobs: (1) It leaves the core and coil assemblies bone dry, as a combination of vacuum and heat remove moisture and entrapped air. (2) While under vacuum it fills all voids with compound. This draws hot compound into the innermost parts of the assembly, preventing local ionization and extending normal insulation life.

Solid compound used in the process is chemically stable, has high dielectric strength and is completely free of absorbed gases and impurities. It stops leakage and contamination.

You'll find Allis-Chalmers vacuum-pressure compound-filled units are a sound investment in accuracy and economy. As thousands of users find, they eliminate testing and filtering oil and greatly reduce periodic inspection.

It's easy to see how the benefits of compound-impregnating process will save you money, can save you trouble. Why not contact your nearby A-C district office for more information today. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3833

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Yes! Electrical Contractors are now in the heating business

U.S.RUBBER'S USKON® Low-Cost Ceiling Panels extend your sales... bring in high profits

As an electrical contractor, you will find Uskon electrical radiant heating to be one of your most profitable items. It actually sells *itself* to *everybody*. Architects like the freedom of design Uskon gives them—no radiators, furnaces, pipes or ducts. Decorators like it for the same reason, and because the panels can be painted over with any ordinary flat paint. Home owners want Uskon because it costs less to install than almost any other kind of heating—and because it gives *quick* heat with a switch or thermostat, is a completely trouble-free heating system.

WHAT DOES USKON MEAN TO YOU? First, Uskon can be quickly and easily applied to new or old ceilings. The home owner heats his house as it grows; when he finishes his expansion attic, he merely orders more panels from you for repeat business. It is a tried and proved product of United States Rubber Company—a name that helps you sell. And Uskon fits in everywhere, in homes, apartments, business offices, commercial and industrial buildings—garages, basements, motels—you name it, Uskon is the *perfect* heating. For complete technical data and cost information write for catalog M3177, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

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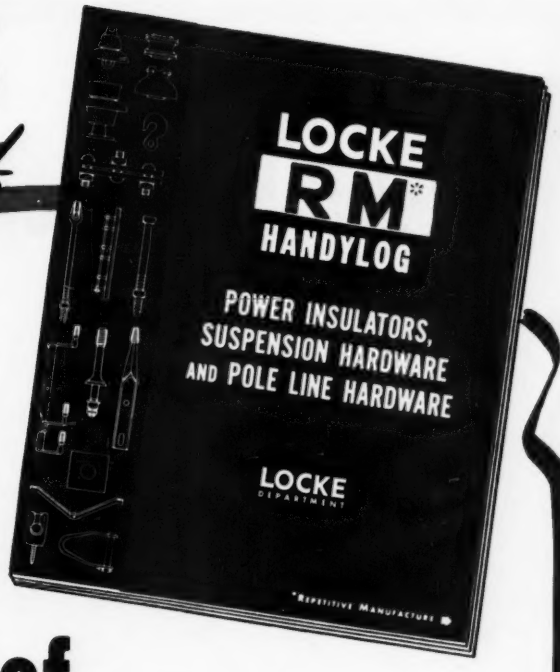
JUST OFF THE PRESS--

and yours for the asking!

3rd edition of

LOCKE'S RM* HANDYLOG of insulators and pole line hardware



This new revised edition lists . . . in 72 pages . . . ALL the pole line hardware, as well as ALL the power insulators and suspension hardware you need for handling over 95% of your jobs. Mail coupon today for your free copy. Place the RM* items on your standards list . . . and you'll benefit five ways:

***RM (Repetitive Manufacture)**
A program designed to help reduce the installed cost per kilowatt on line and station equipment.

1. **YOU SIMPLIFY** stocks and stocking operations.
2. **YOU PAY LOWEST PRICES** because RM items are standard items . . . produced in large quantities.
3. **YOU GET PROMPT SERVICE** because RM items are carried in stock by Locke Regional and Distributors' warehouses.
4. **YOU GET FAST DELIVERY** because RM items are always in production . . . on hand for immediate shipment from factory.
5. **YOU REDUCE CHANCES OF OBSOLESCENCE** because assured availability of RM items allows you to match future extensions to present construction.

LOCKE
LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

MAIL THIS COUPON TODAY

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BALTIMORE, MARYLAND

Please send me my copy of Locke's new RM* Handylog.

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stop!

Why the BullDog trademark identifies

Reprints of this thoroughbred bulldog, by the famous artist Durenceau, will be sent upon request. No cost or obligation. Address: BullDog Electric Products Company, Dept. EW23, Detroit 32, Michigan.

the best in electrical equipment

If there is one thing which distinguishes BullDog electrical distribution equipment, it is the unmistakable evidence of the *thoroughbred.*

This goes far beyond merely competent product performance. It touches every phase of the product . . . its appearance, its economy, its ease of handling, its durability, its operating convenience.

Because of this emphasis on total product excellence, BullDog products stand apart. In BullDog Safety Switches, Pushmatic Electri-Centers, Panelboards, Trol-E-Duct, BUStribution Duct, and all others, you see the evidence of the product thoroughbred. Through *integrated design,* all components of each BullDog product work together in perfect harmony . . . for the fullest efficiency, performance, usefulness, economy and long life.

Keep these things in mind when you specify or buy electrical distribution equipment. Look for the BullDog symbol on the products you buy. Our adherence for 50 years to this manufacturing ideal makes BullDog equipment, by all odds, your finest buy.

* * *

For on-the-job assistance in planning your electrical distribution systems, call in a BullDog Field Engineer.

BULLDOG

ELECTRIC PRODUCTS COMPANY

Detroit 32, Michigan

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BullDog Electric Products of Los Angeles
P. O. Box 7385, Lugo Station
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Young Electric & Manufacturing Company
2134 Curtis Street
Denver 2, Colorado

New G-E Rapid Start lamp needs no starter, cuts maintenance

IN THE NEW RAPID START lamp circuit G-E has been able to eliminate the starter required in standard lamps to pre-heat the cathode. For that reason, maintenance is even easier, more economical than before.

This new General Electric *Rapid Start* lamp was made possible by two G-E developments: an improved triple-coil cathode that replaces the double coil in standard fluorescent lamps, and a *Rapid Start* ballast. Together, they give General Electric *Rapid Start* lamps almost instant starting and smooth, simple operation.

G-E *Rapid Start* fluorescent lamps are rapidly becoming available. Many leading fluorescent lighting fixture manufacturers are incorporating the new lamps and ballasts in their latest equipment. These two newest developments of G-E research are another reason why you can *expect* the best value from General Electric fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

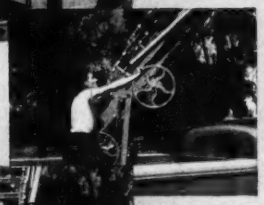
THIRTY FEET HIGH in THIRTY SECONDS

Simple, Easy, One-Man Operation

1. Ladder hold-down on cab roof is released.

2. Pressure is applied to lower ladder rung.

3. Ladder is locked in elevated position.



4. Upper section is extended to desired height.

5. Ladder is rotated to spotting position.

6. Incline of ladder is adjusted as required.

POWERS American SERIES 5510

REVOLVING AERIAL LADDER

Sounds unbelievable . . . but the *Powers-American* Aerial Ladder is so simple, so fast, and so easy to operate that it can be raised to a working position in only 30 seconds—by *one man!* This versatile ladder can be spotted in 40 positions throughout a 360° revolution . . . inclined to any angle from 30 to 75 degrees. Its curved platform falls into position automatically—to provide a level working surface. What's more, this ladder is so safe that it will support *five* times the normal working load. If your operation calls for overhead work, get all the facts on *Powers-American* Aerial Ladders. Mail the coupon NOW for complete information.

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Name_____

Company_____

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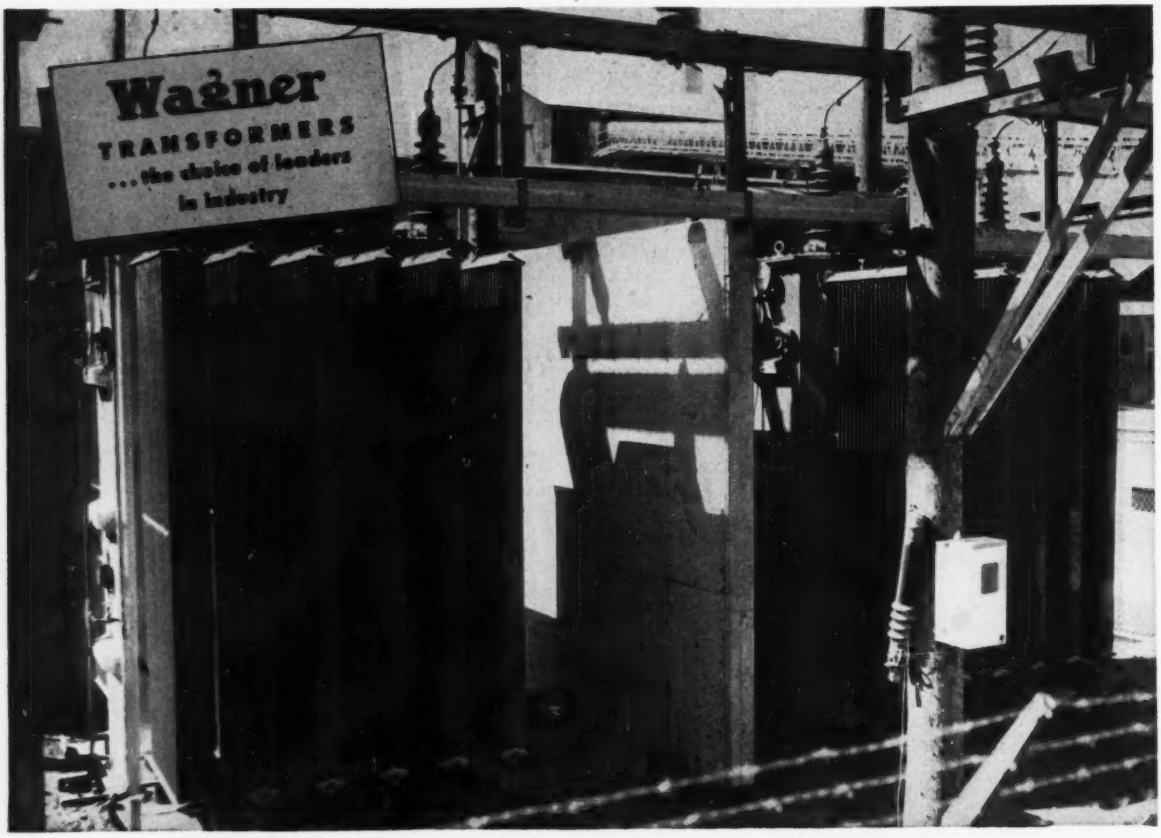
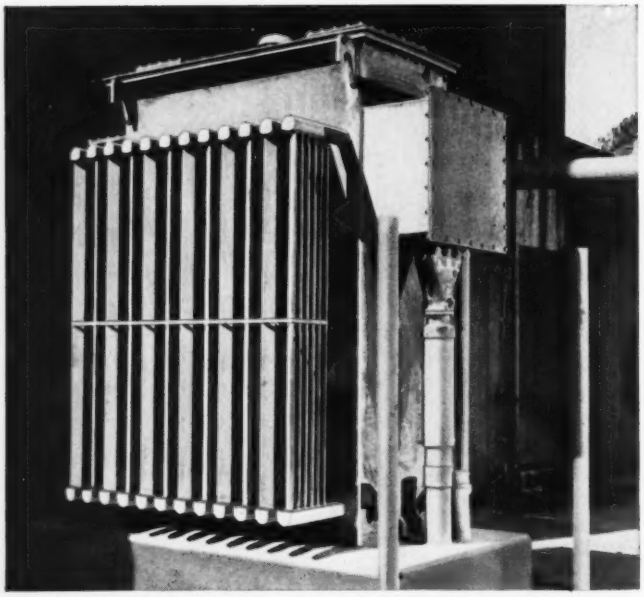
City_____ Zone_____ State_____



DUPLICATE TRANSFORMERS and feeders allow either to carry load in emergencies. The three phase Wagner Power Transformers are each rated 6000 kva with provision for an increase in capacity to 8000 kva for future expansion.



ONE OF FIVE Wagner three phase, non-inflammable liquid filled unit substation transformers used in this installation. Each transformer is rated 750 kva, 2400 to 480 volts, 60 cycle; and each is located as close as possible to load center.

Wagner Power Transformers have been serving the power industry dependably for over sixty years. They are compact in design and are built with painstaking care to give them inherent strength and stability. They have sufficient capacity to not only carry their normal load, but to be able to handle loads—again and again—whenever emergencies arise.

Consult a Wagner engineer on your next transformer installation. Thirty-two branch offices, located in principal cities, are at your service. Bulletins TU-180 and TU-181 give information on the complete line of dependable Wagner Transformers.

Wagner Transformers selected for modernized distribution system in midwest cement plant

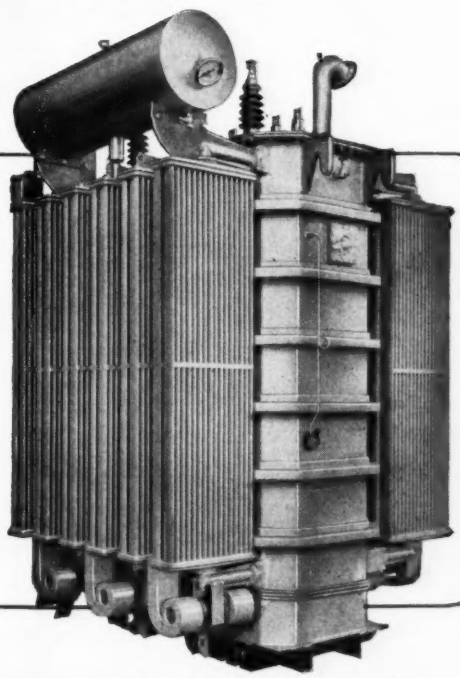
Cement making is a 24-hour, 7-day week business requiring some 80 separate operations, the use of much heavy processing machinery and equipment, and tremendous amounts of dependable power.

The modernized Prospect Hill plant of the Missouri Portland Cement Company provides a fine example of an up-to-date distribution system in an application where considerable amounts of power are utilized at primary voltages. 12,000 kva of transformer capacity was required for connected and demand loads, with provisions for a 33 percent increase in capacity for future expansion.

Two Wagner 3 phase power transformers, each rated 6000 kva, with an ultimate of 8000 kva to be obtained with the addition of cooling fans, were used to meet this requirement for the main substation.

In addition to the main substation, there are five 750 kva unit substations, each located as close as possible to the load centers of the particular areas they serve. These substations are powered by three phase Wagner unit substation transformers, each with identical specifications.

Wagner transformers were chosen for this installation, as they are for a great many industrial and power company installations, because of their ability to give continuous service over unusually long periods of time.



Wagner Power Transformers meet ASA C57 standards

Now, you can simplify your specifications and gain the advantages of improved design at reduced cost by ordering *standardized* Wagner Power Transformers. Wagner Transformers meet all ASA C57 standards for voltage ratings, taps, impedances and both standard and optional mechanical features. Get full information from your nearby Wagner engineer, or write us.

WAGNER ELECTRIC CORPORATION
6381 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

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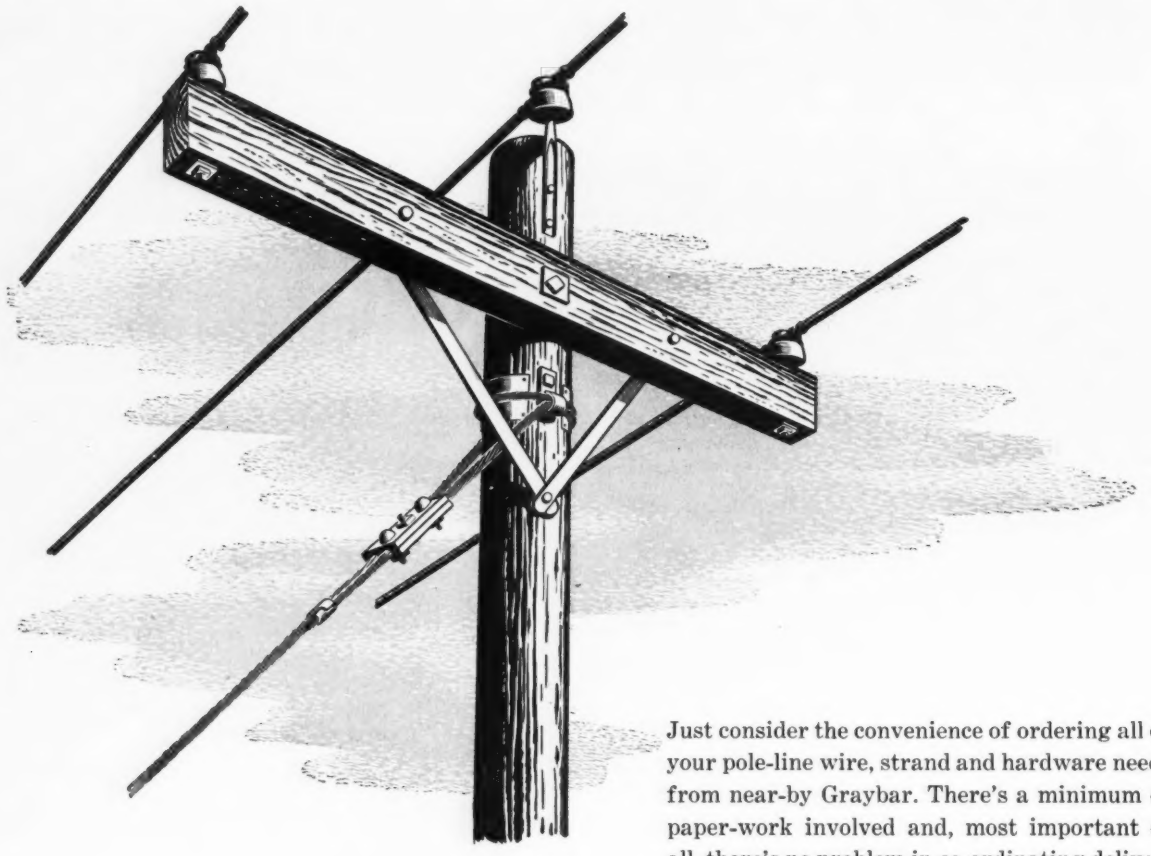


Just consider the convenience of ordering all of your pole-line wire, strand and hardware needs from near-by Graybar. There's a minimum of paper-work involved and, most important of all, there's no problem in co-ordinating deliveries from numerous widely-separated suppliers.

Graybar thoroughly understands the needs of the nation's power companies . . . can furnish supplies and materials "from the bottom of the hole to the top of the pole." Graybar Outside Construction Specialists are always ready to help you plan or carry out any project.

Taken all together, you can see why it pays to call Graybar first for everything electrical . . . routine or emergency. *Graybar Electric Company, Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.*

311-82

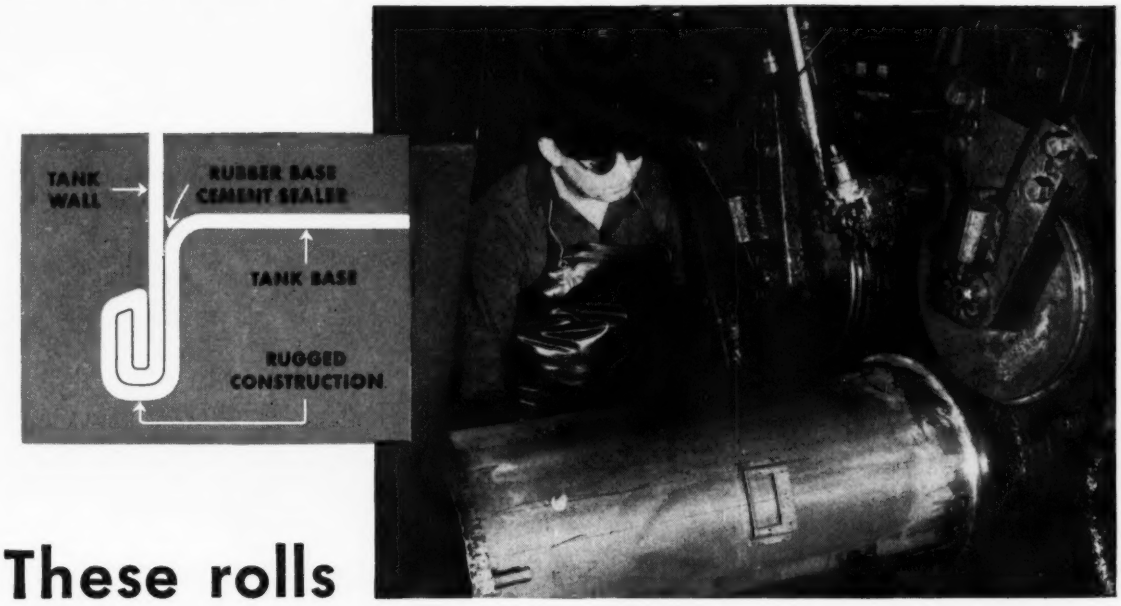
LINE WIRE
STRAND
HARDWARE

...all via GraybaR

Call Graybar first for...

GraybaR Everything Electrical GraybaR ELECTRIC COMPANY
SINCE 1869 * REG U.S. PAT OFF

IN OVER 100 PRINCIPAL CITIES



These rolls squeeze trouble out

Of course you don't drop transformers off tail gates, or skid them across concrete floors and roadways. That is, you don't plan for these things to happen. But experience shows they sometimes do.

That's why machines like the one above roll a double seam, joining the base to the tank of every Westinghouse Distribution Transformer. As the rolls squeeze down, they compress a rubber cement applied to the surface of the metal. This cement fills up any capillary spaces which might normally exist.

Result: A positive seal to prevent any leakage . . . a reinforced base as a protection against severe handling . . . additional protection against corrosion at a vulnerable point.

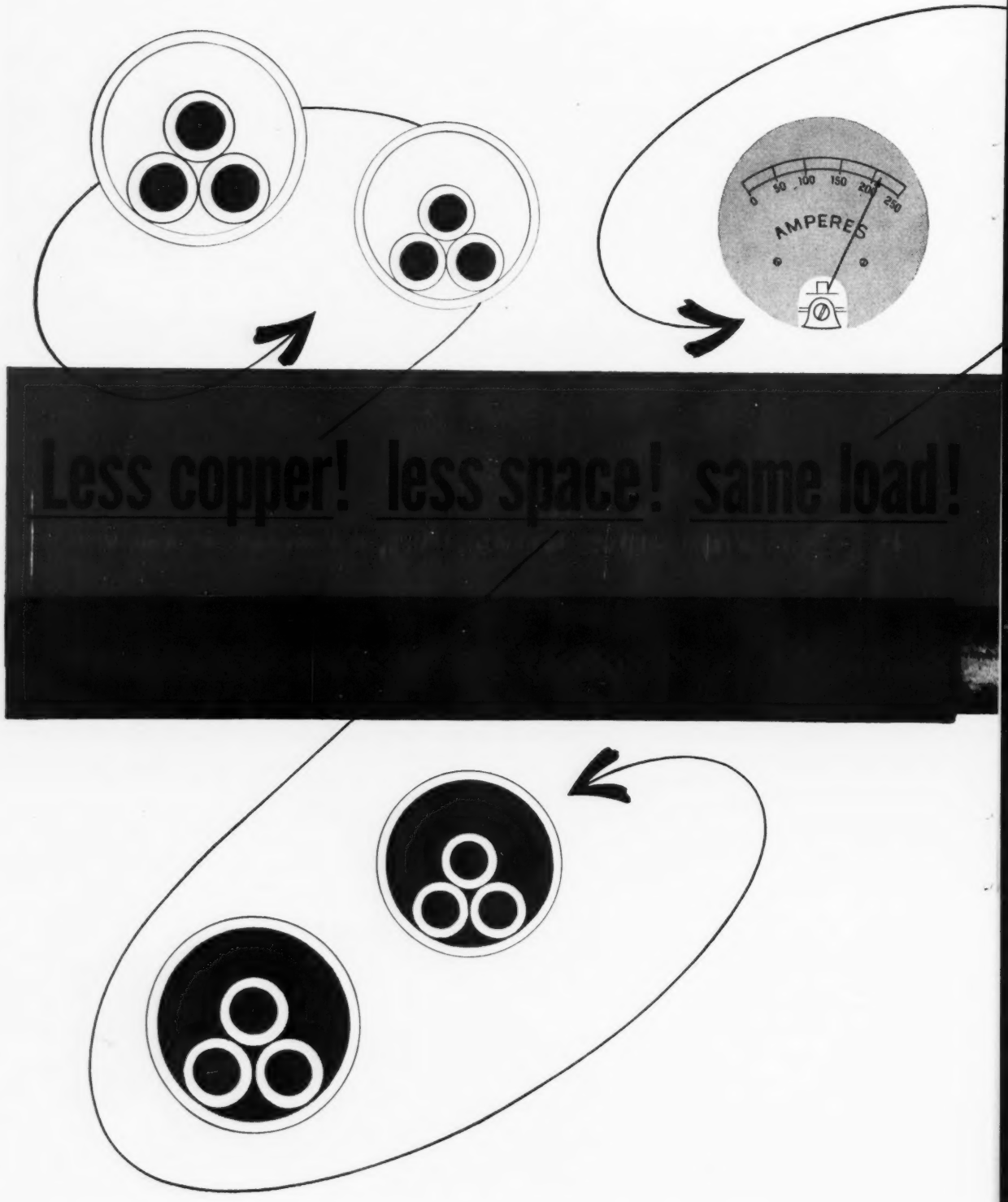
This is another of the extra values like Coastal Finish, extra-strength bushings, and many more, that contribute to the trouble-free dependability of Westinghouse Transformers. They add up to better service, less servicing. Your Westinghouse Representative will be glad to give you further information about these features, or write for Booklet B-4249A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

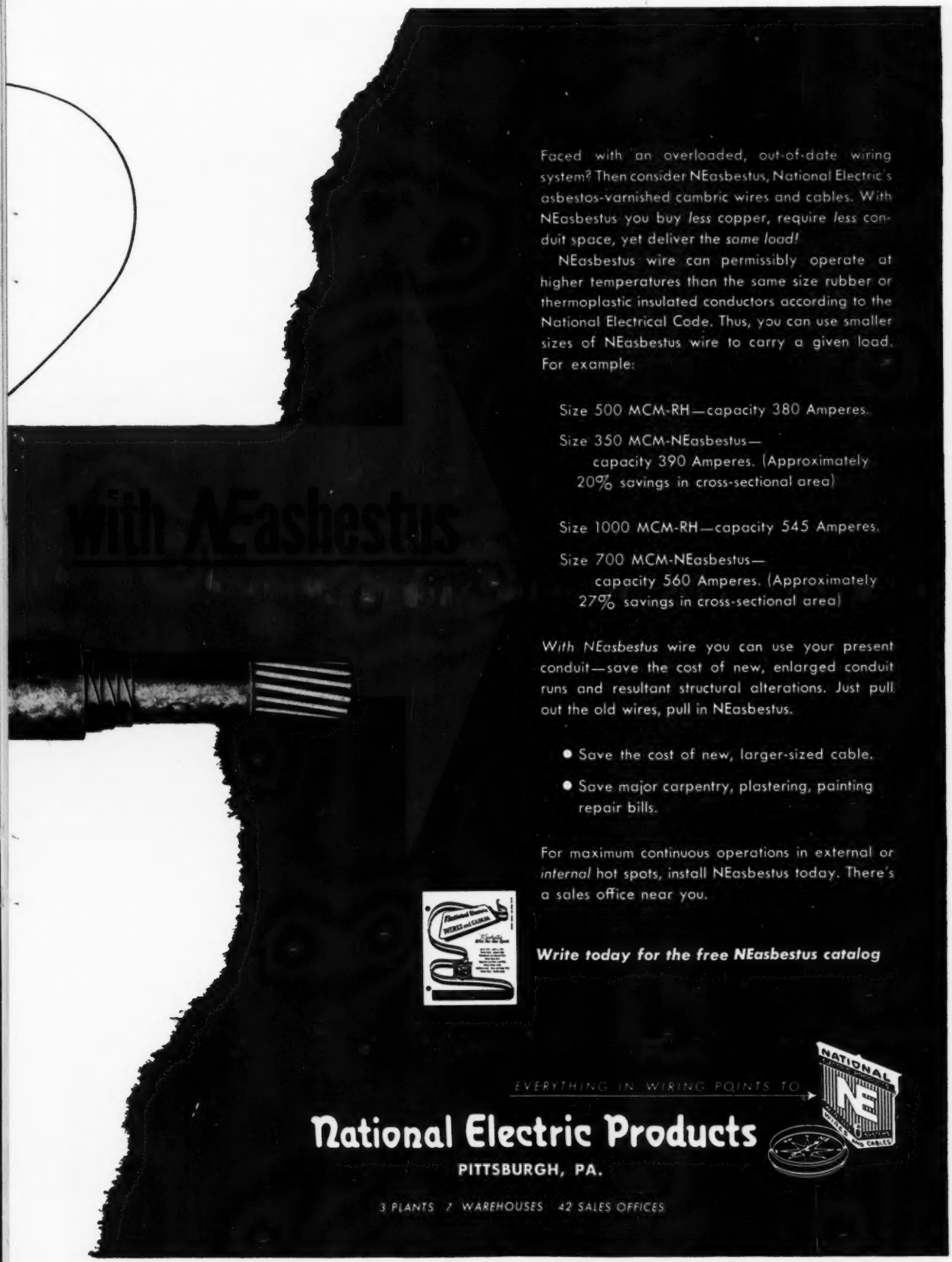
J-70658

YOU CAN BE SURE...IF IT'S Westinghouse

DISTRIBUTION TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver


0 50 100 150 200 250
AMPERES
Less copper! less space! same load!



Faced with an overloaded, out-of-date wiring system? Then consider NEasbestus, National Electric's asbestos-varnished cambric wires and cables. With NEasbestus you buy *less* copper, require *less* conduit space, yet deliver the *same load!*

NEasbestus wire can permissibly operate at higher temperatures than the same size rubber or thermoplastic insulated conductors according to the National Electrical Code. Thus, you can use smaller sizes of NEasbestus wire to carry a given load. For example:

Size 500 MCM-RH—capacity 380 Amperes.

Size 350 MCM-NEasbestus—
capacity 390 Amperes. (Approximately 20% savings in cross-sectional area)

Size 1000 MCM-RH—capacity 545 Amperes.

Size 700 MCM-NEasbestus—
capacity 560 Amperes. (Approximately 27% savings in cross-sectional area)

With NEasbestus wire you can use your present conduit—save the cost of new, enlarged conduit runs and resultant structural alterations. Just pull out the old wires, pull in NEasbestus.

- Save the cost of new, larger-sized cable.
- Save major carpentry, plastering, painting repair bills.

For maximum continuous operations in external or *internal* hot spots, install NEasbestus today. There's a sales office near you.

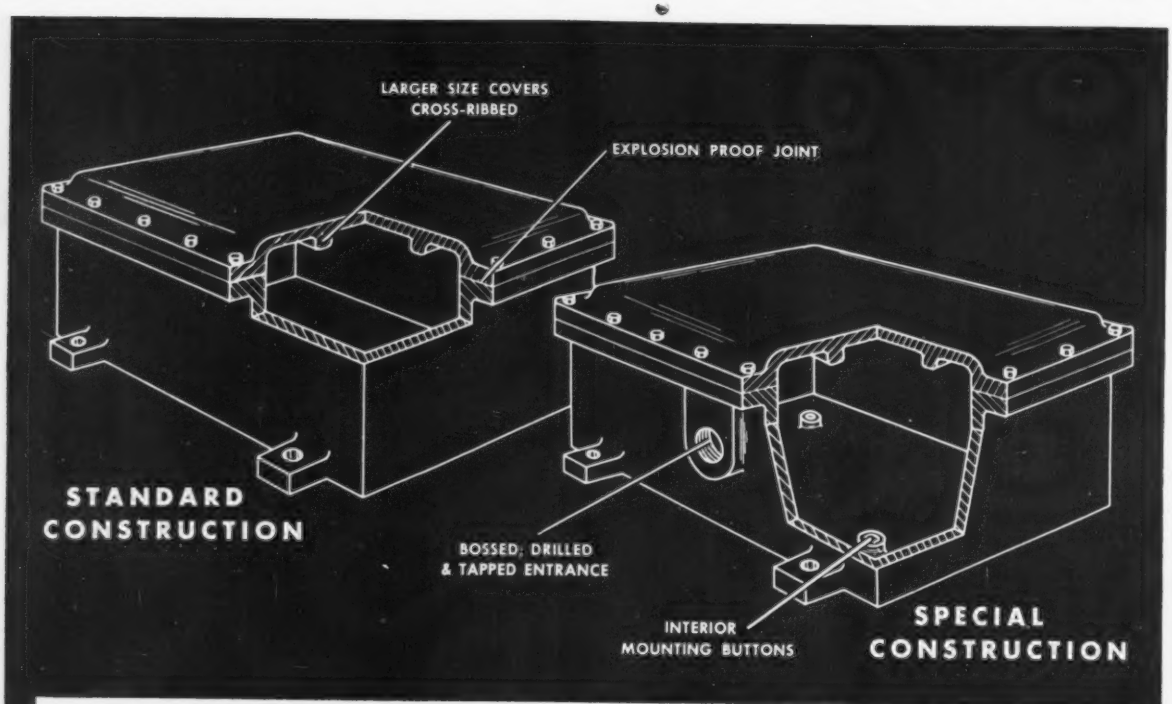
Write today for the free NEasbestus catalog

EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 PLANTS 7 WAREHOUSES 42 SALES OFFICES



Leading engineering and erection firms agree:

For hazardous locations, you can count on EXPLOSION HOUSINGS by HOPE

FIRST, see how *thoroughly* Explosion Housings by Hope meet every requirement for installation in Class I, Groups C and D hazardous locations.

Boxes and covers are of extra-strong construction. Covers are cross-ribbed on larger boxes. (Naturally, like all Boxes by Hope, Explosion Housings are of strong, dense cast iron, hot dip galvanized for both service durability and lastingly attractive appearance.)

Precision finished metal-to-metal joints assure explosion-proof construction. Housings have been successfully used as junction and pull boxes and as enclosures in refineries, chemical plants, paint plants, dry cleaning establishments, powder mills and pumping stations.

NEXT, see how *easily* Explosion Housings by Hope meet your every need:

You can select the Housing you want from a list of *81* standard sizes.

You can order special modifications at moderate cost. For instance: entrances can be drilled and tapped to your specifications. Bosses can be supplied to insure five threads on larger-sized conduit holes. Interior blind-tapped mounting buttons can be furnished for safe and easy installation of apparatus or panels. Heavy covers can be provided with bronze hinges.

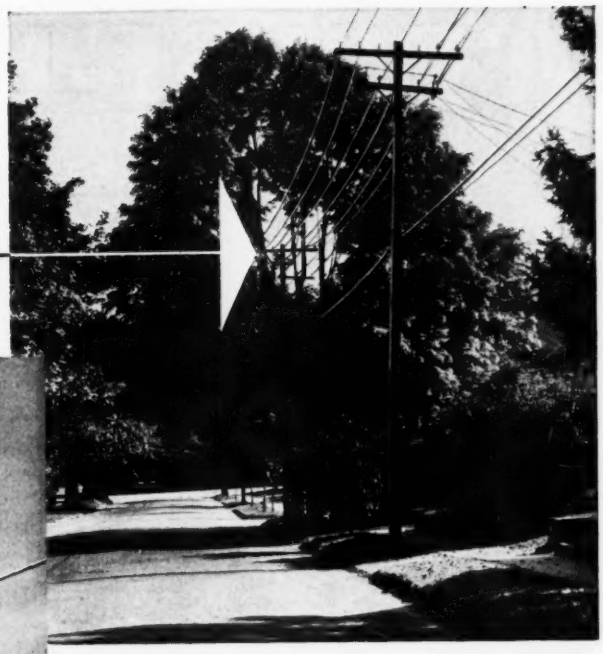
AND . . . you can order the Explosion Housings you want — standard or with special modifications — through your local electrical distributor!

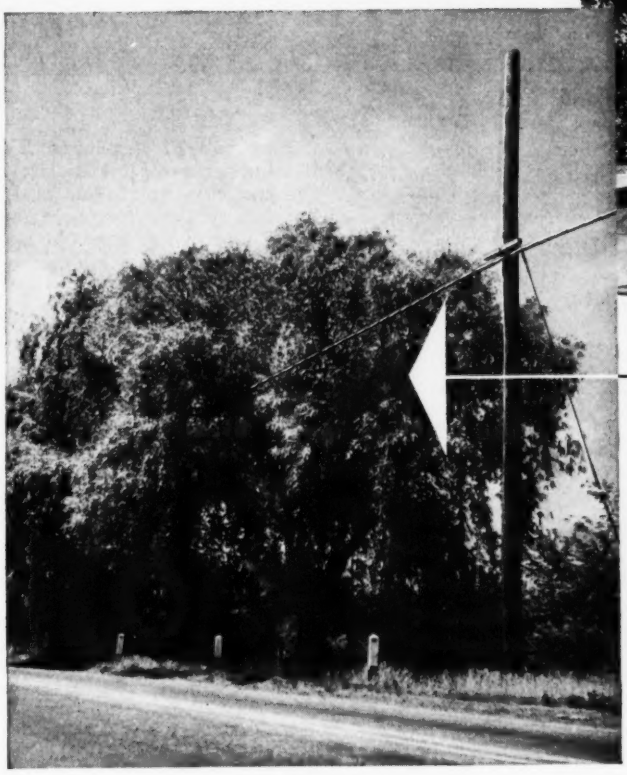
HOPE

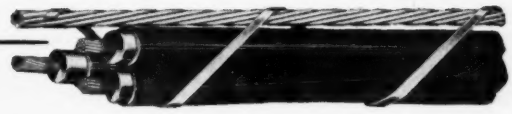
ELECTRICAL PRODUCTS CO., INC.
338 Wilson Ave., Newark 5, N. J., Mitchell 2-4426

FOR THE FULL STORY ON EXPLOSION HOUSINGS BY HOPE
—and also on our line of hundreds of sizes of weatherproof products: outlet boxes and fittings, junction and pull boxes, hinged cabinets and terminal boxes—write on your letterhead for a copy of our latest catalog

Why trim trees like this







when you can use G-E Preassembled Aerial Cable

General Electric's Super Coronol* preassembled aerial cable fills the need for distribution circuits up to 15 kv where appearance, safety, and service continuity are desired at a reasonable cost, and where underground construction is not warranted. Along tree-lined streets in particular, G-E aerial cable has given outstanding service and has largely eliminated the cost and ill-will resulting from tree trimming.

The record of hundreds of installations shows that G-E aerial cable will stay in service when wind, snow, ice, and falling trees place open wire in trouble. In some cases where the pole plant was down, G-E preassembled aerial cable continued to operate satisfactorily even while lying on the ground.

For more information see your General Electric Wire and Cable specialist, or write Section W65-225, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

CROUSE-HINDS EV Series

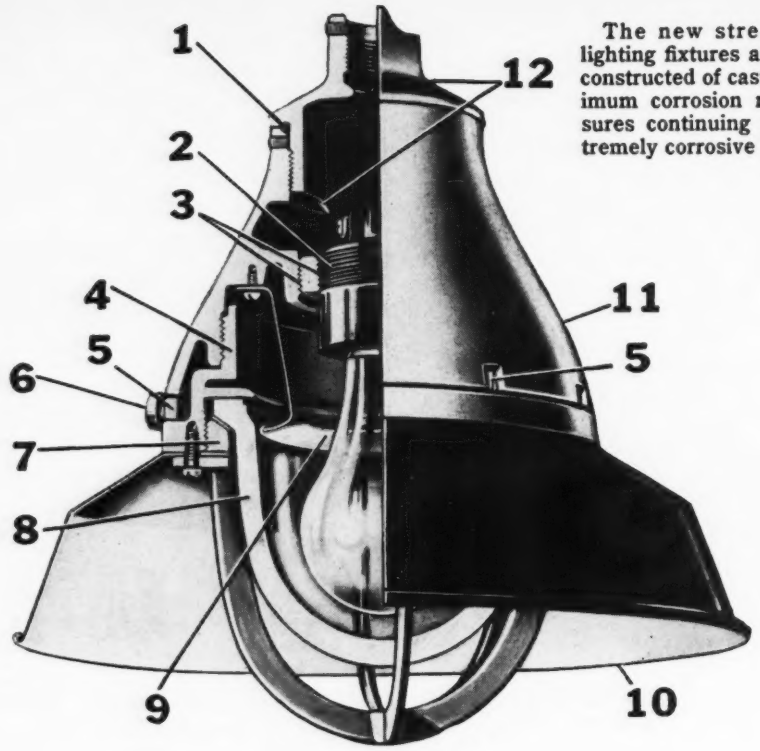
have been redesigned to give you:

EASIEST installation

EASIEST maintenance

HIGHEST efficiency

This adds up to big savings on every installation!

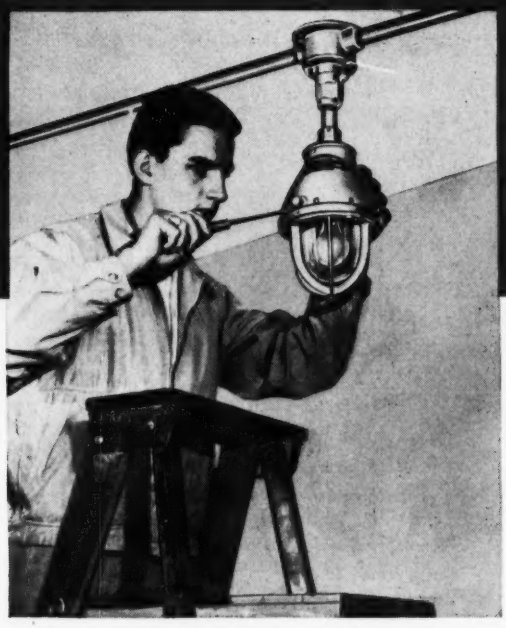


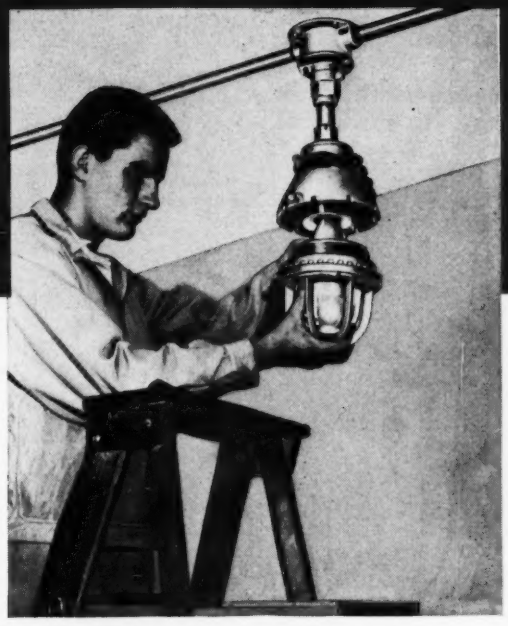
The new streamlined EV lighting fixtures are completely constructed of cast metal. Maximum corrosion resistance insures continuing safety in extremely corrosive locations.

1. Rubber O-ring gasket . . . seals joint against dirt or liquids.
2. New improved shock-absorbing receptacle has "universal" action . . . absorbs shock from *any* direction.
3. Threaded joints are flame tight . . . no sealing compound or external seals are required.
4. Lightweight one-piece assembly of globe, holder, guard and reflector is threaded high up inside of hood . . . no liquid or dirt can enter.
5. Notches in hood and globe holder . . . easy to loosen with a screwdriver.
6. Large knurled thumb screw . . . sets between notches for positive locking.
7. Globe retaining ring and cushioning gasket.
8. Heat and impact resisting globe. The accurately ground flange, essential for safety, is protected in a factory assembled joint . . . never exposed to damage.
9. Auxiliary reflector . . . etched Alzak aluminum . . . eliminates "trapped" light.
10. Porcelain enameled steel reflector.
11. Cast aluminum hood.
12. Cast aluminum body . . . has two openings for easier wiring from either side.

CONDULETS · AIRPORT LIGHTING

Explosion-Proof LIGHTING FIXTURES





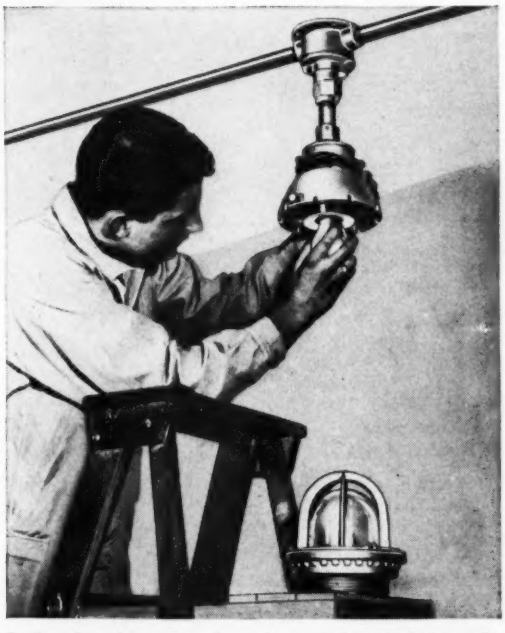
Easiest Relamping—3 Simple Steps

1. Single unit globe-holder assembly threaded into fixture hood is quickly removable for relamping. Slots are provided for prying with a screw-driver when necessary in corrosive atmospheres or other severe conditions. A large knurled thumb screw is easily loosened to unlock the globe and holder.

2. Globe and holder complete with guard (and reflector if used) is removed as an assembly. Only one lightweight piece to handle—globe retained in holder with flame-tight joint fully protected. Explosion-proof integrity assured. The 200/300-watt globe-holder assembly weighs but 8 lbs.

The new design of EV Explosion-Proof Lighting Fixtures is based on exhaustive studies and tests in Crouse-Hinds laboratories. The goal was to produce a fixture that would be easier to install and easier to relamp than any other explosion-proof fixture. Crouse-Hinds designers not only achieved this result but also created a fixture having the highest possible lighting efficiency.

You get 3-way savings when you install Crouse-Hinds EV Lighting Fixtures: quicker installation; quicker relamping; more light. This makes them the best buy for lighting in any location that is hazardous because of the possibility of the presence of flammable atmospheres. Use them on every job and have the best!



3. In relamping only a lamp is carried up and down the ladder and one assembly handled. It is not necessary to stock any spare parts or assemblies for complete convenience.

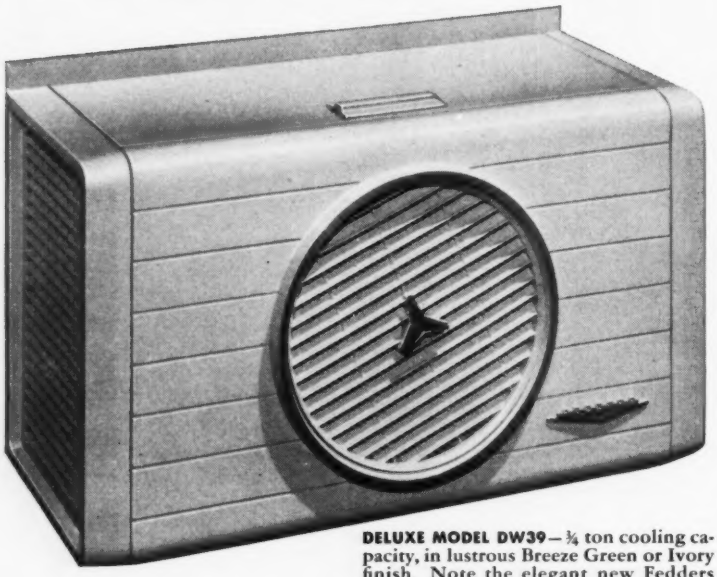
CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver Detroit — Houston — Indianapolis — Kansas City — Los Angles — Milwaukee — Minneapolis New Orleans — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle St. Louis — Tulsa — Washington. RESIDENT REPRESENTATIVES: Albany — Atlanta Baltimore — Charlotte — Corpus Christi — Richmond, Va. — Shreveport Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

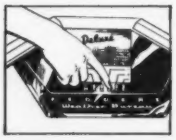
TRAFFIC SIGNALS · FLOODLIGHTS

NOW! IT'S PUSH-BUTTON WEATHER

With 1953's most sensational selling feature... the Exclusive FEDDERS *Built-In Weather Bureau*

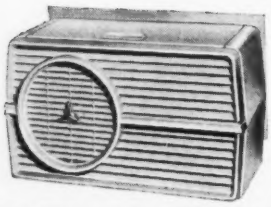


DELUXE MODEL DW39—¾ ton cooling capacity, in lustrous Breeze Green or Ivory finish. Note the elegant new Fedders nameplate—V for famous V-coil!

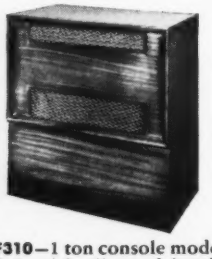


"NOW—the weather you want at the touch of a button!" That's the Fedders line... and your line... for '53. Raise the lift tops of these handsome new units and you've got real demonstration drama... the Built-In Weather Bureau! It's the industry's greatest advance in room air conditioner selling! Press a button—cooling! Press a button—ventilation! Press a button—air removal! Press a button—sales!

Fedders—still the most complete line in the industry—is brand-new inside out. *Power*-full cooling capacity. Easily-removable extra-large filters. Sleek new styling in both window and console models by the appliance industry's most brilliant designer, Mel Boldt. All window models are available in the striking new sales-influencing color—cool Breeze Green! Call your Fedders distributor today for complete details or write Fedders-Quigan Corp., Dept. EW-1, Buffalo 7, New York.



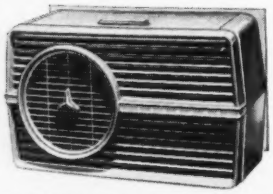
MODEL W311—1 ton cooling capacity—the most powerful window model room air conditioner ever developed. Beautiful in Breeze Green.



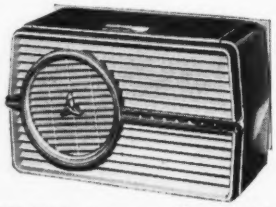
MODEL F310—1 ton console model. (Also 1½ ton.) In rich all-wood hand-rubbed cabinets. Either Mahogany or Avodire Blond finish.

MODEL F17—¾ ton console model. Made by master craftsmen. Available in either Mahogany or popular Avodire Blond finish.

STANDARD MODEL W39—¾ ton cooling capacity, finished in the season's smartest color—Breeze Green. A decorative asset to any room!



MODEL W34—⅓ ton cooling capacity. A model designed especially for bedroom installation. In Breeze Green or soft-toned Ivory.

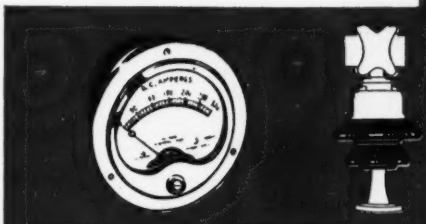


MODEL W36—½ ton cooling capacity, superbly styled in handsome Breeze Green or Ivory... and jam-packed with new features.

Sell the line with ALL the features... for '53—*it's* FEDDERS!

ASK YOUR DISTRIBUTOR FOR DETAILS OF FEDDERS SECRET PROFIT PLAN NO. 7

MAKING



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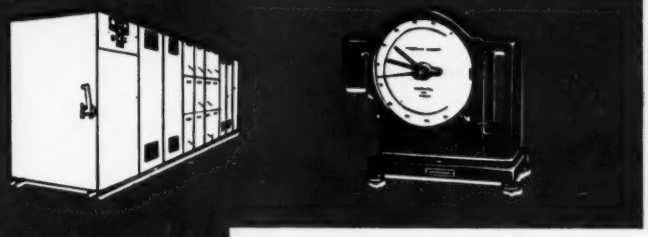

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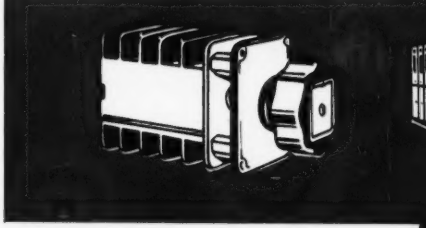
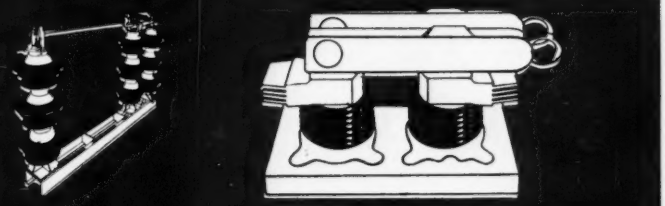
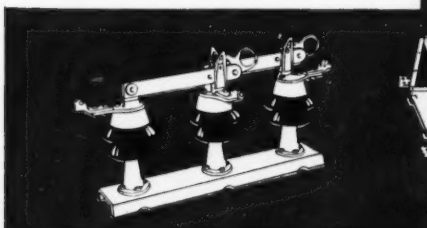


BEST

DISCONNECT SWITCHES • OUTDOOR HOOK STICK SWITCHES • AIR BREAK SWITCHES • INDOOR AND OUTDOOR BUS SUPPORTS • BUS DUCTS • SUBSTATIONS





OIL AND AIR CIRCUIT BREAKERS • HIGH AND LOW VOLTAGE SWITCHGEAR • UNIT SUBSTATIONS • INSTRUMENTS • PRECISION BALANCES • WATTHOUR METERS

A new series of bulletins, completely illustrating and describing each item in the Roller-Smith and Elpeco lines, is now available. If you will indicate the particular type of equipment in which you are interested, we will be glad to send appropriate bulletins by return mail.

ROLLER-SMITH CORPORATION AND ELPECO DIVISION

Your communications are his specialty

Here's a man who rides herd on trouble. He works in the field, guarding your power line communications against interruptions. In case of emergency, he's *out* there, ready and equipped to restore service quickly. While he works, other technicians may reroute your communications over an alternate circuit in the vast Bell System network.

This alert lineman, and lots of other specialists like him, are on *your* team when you lease communications from the Bell System.

Communications have been our special business for more than 75 years. That's why we have the best equipment and trained personnel to maintain it.

We can provide the power line industry with private-line telephone, mobile telephone, and teletypewriter services, and channels for remote metering, supervisory control and facsimile. And these are flexible services — which we expand or contract to give you exactly the communications each changing situation calls for.

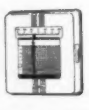
• • •

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE



METERING CHANNELS

BELL TELEPHONE SYSTEM

THREE-DIMENSIONAL REPRESENTATION of impulse voltages in a simple helical coil. Model was prepared from measurements made in G.E.'s High-voltage Engineering Laboratory at Pittsfield, Massachusetts.

Major G-E development promises new high in reliability of super power transformers

NEW METHOD, PERFECTED OVER THREE-YEAR PERIOD, SIMPLIFIES ANALYSIS OF TRANSIENT VOLTAGES

In high-voltage transformer windings, insulation is a costly necessity. It complicates thermal and electrical characteristics and requires the use of additional copper and iron, thus adding to a transformer's over-all size and weight. Most efficient use of insulation is obtained when the designer has complete knowledge of the transient voltages which can occur under impulse conditions.

General Electric engineers were the first to prove the existence of dangerous transients in all transformers under impulse. They pioneered methods for calculating them, developed shielding to protect against them, and introduced commercial impulse testing as the user's assurance of reliability.

With the growing demand for transformers having higher and higher voltage and kva ratings, a more rapid means of determining transient voltages would speed up the manufacture of these large units and increase their reliability. For many years, engineers the world over have been working to obtain such a method.

Transient-voltage phenomena are very complicated as illustrated above. In modern power transformers, these voltages are even more complicated due to a wide variety of winding structures and arrangements, taps and ducts.

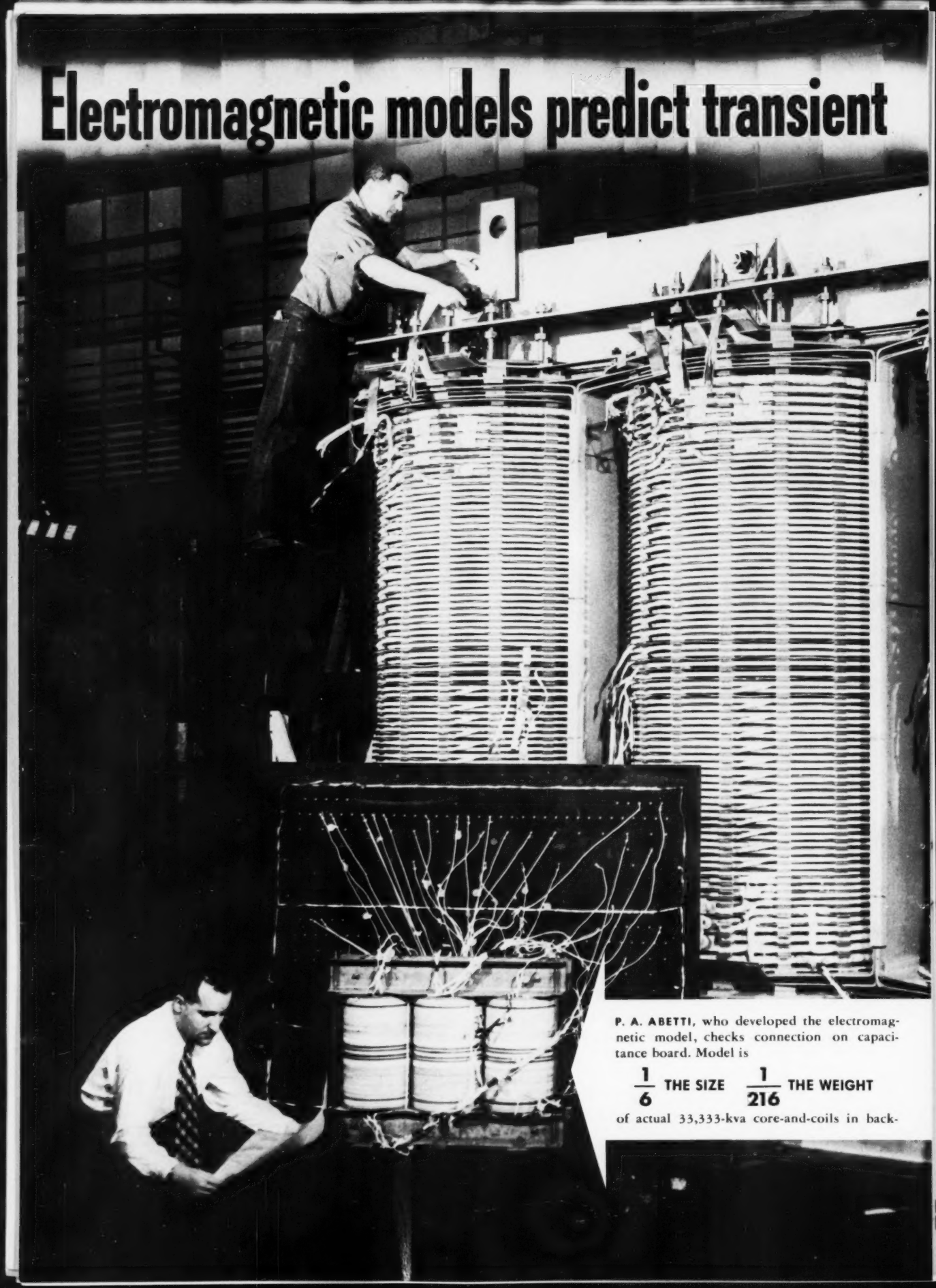
Purely mathematical computation of transients has yielded good results on a single uniform coil, but is extremely laborious and impractical for larger, more complicated transformers. Three years ago, G-E research and development engineers launched a program to find a practical means of furnishing, in the design stage, the transient voltage magnitudes and wave shapes at as many points in the winding as required by the designer.

G-E studies considered both geometrical models, which cannot reproduce the transient response of the original transformer, and equivalent-circuit models whose mutual inductances, capacitances and other characteristics cannot be computed accurately in a reasonable time. Neither method was found to be practical. Finally, in a major contribution to the transformer art, General Electric engineers combined the best features of both types in the *electromagnetic model.*

For further details, see next page→

GENERAL ELECTRIC

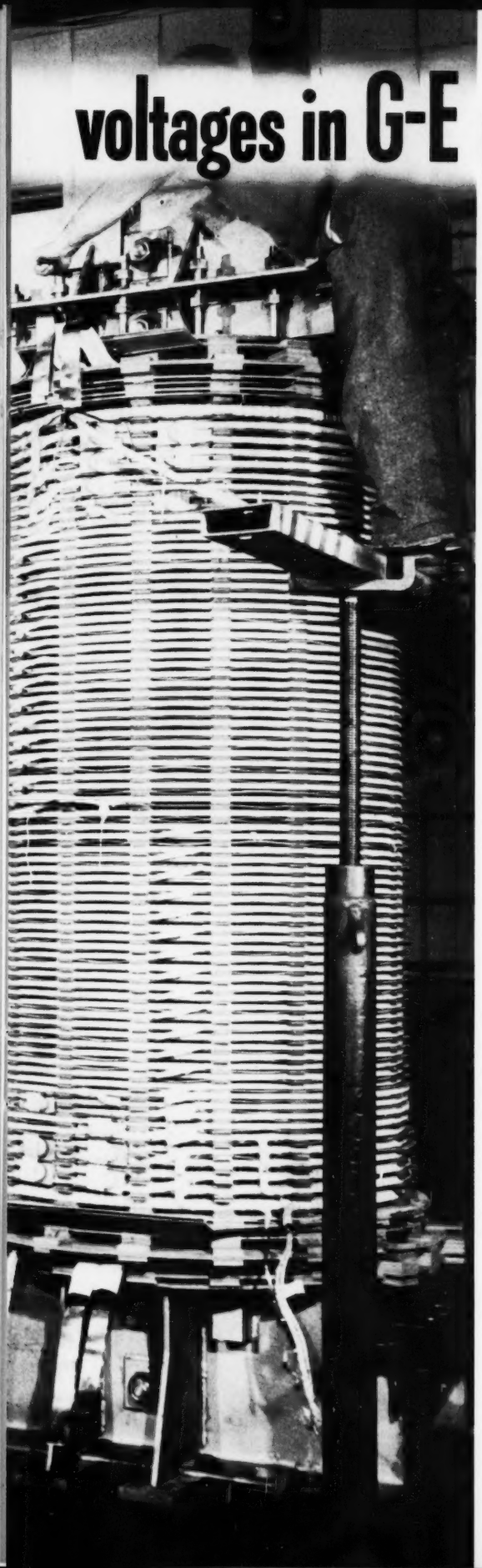
Electromagnetic models predict transient



P. A. ABETTI, who developed the electromagnetic model, checks connection on capacitance board. Model is

$\frac{1}{6}$ **THE SIZE** $\frac{1}{216}$ **THE WEIGHT**

of actual 33,333-kva core-and-coils in back-



voltages in G-E power transformers . . .

before they are built!

With the *electromagnetic model*, General Electric engineers can quickly obtain complete and accurate knowledge of transient voltages in any power transformer . . . in the design stage.

Voltage magnitudes and wave shapes can be determined for all points of interest, for all types of applied waves, and for all winding connections. The following maximum transient voltages are typical of the information now at the G-E designer's finger tips:

1. Voltages from impulsed winding to ground.
2. Voltages across large parts (6 to 50%) of winding.
3. Voltages across small parts (1 to 5%) of winding.
4. Voltages to ground transferred to non-impulsed windings.

The first electromagnetic model was a model of a single-phase transformer rated 667 kva, 13,200 to 2400/4160 Y volts. Since that time, models of progressively higher ratings have been built and tested. Typical is the model shown, of a three-phase transformer rated 33,333 kva, 115,000 to 37,090 Grd. Y to 4,160 volts. This model was designed and built in advance of the actual transformer shown with it. It has 156 points available for test.

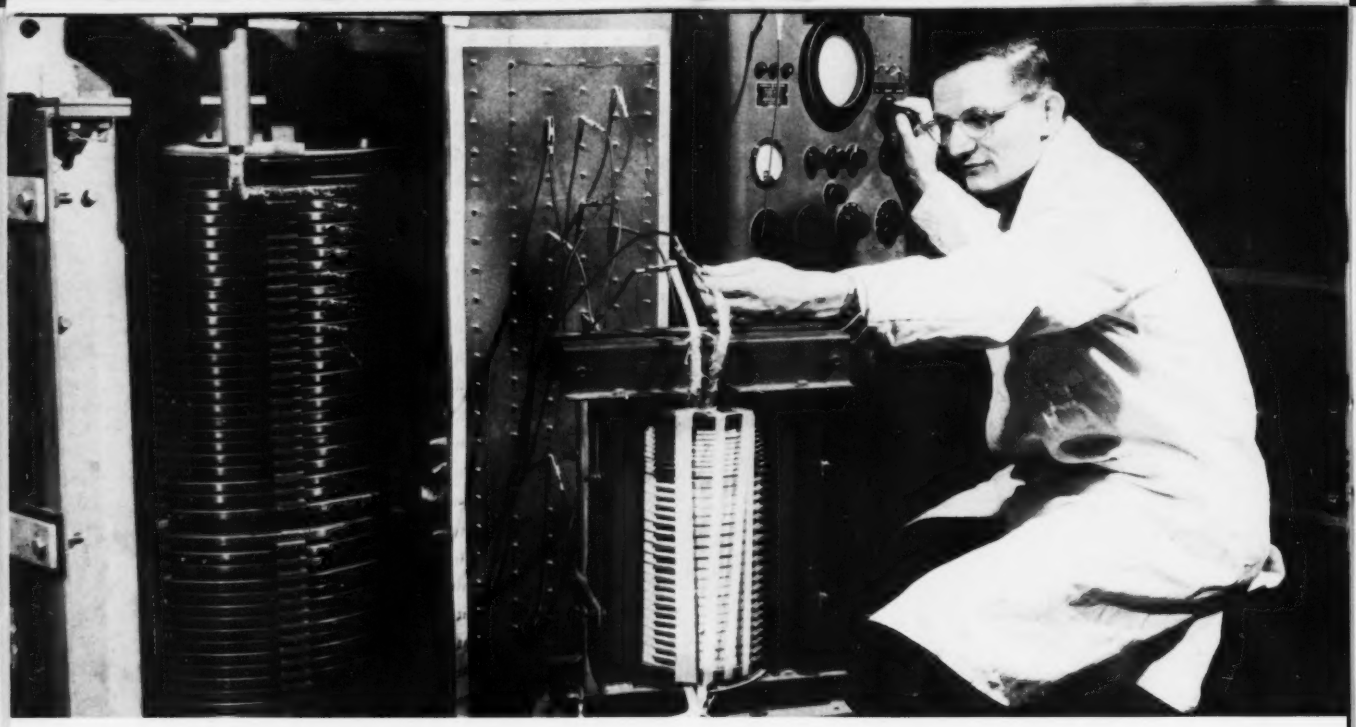
Among the many models that have been built to date is that of a proposed three-phase 250,000-kva transformer, 138,000 to 15,000 volts. The model has one-tenth the length and one-thousandth the weight of the full-size transformer. Four different winding arrangements were tried to determine the most effective structure for this transformer. A model will soon be built of the 300,000-kva, 161-kv transformers now on order.

Electromagnetic models are now being used to improve present transformer designs and to determine transient voltages in new winding structures. In special cases, models are being built to determine which winding structure is best suited to meet a particular transformer's requirements. They are also used to determine the performance of a transformer as a component of the power system.

The new knowledge of transient voltages gained with this development is already reflected in design improvements which are bringing a new high to the reliability of your G-E power transformers.

Progress in Power Transformers

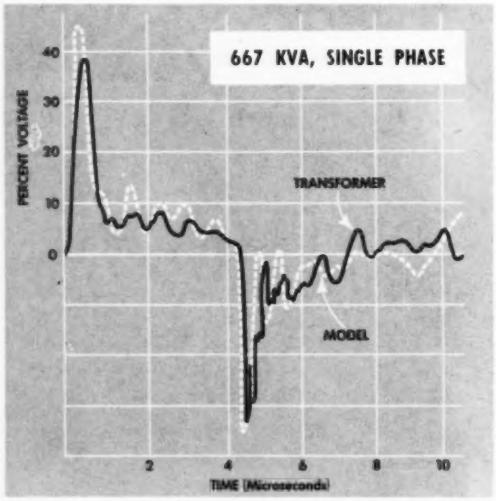
GENERAL ELECTRIC



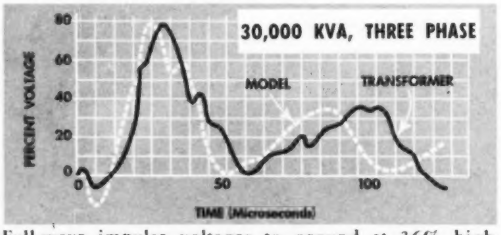
Test results check accuracy of "electromagnetic models" against performance of actual core-and-coils

On eleven models built and tested in 1950 and 1951, 238 measurements of the maximum voltages between corresponding points on the models and on the actual transformers showed an average deviation equal to only 4.3 percent of the applied wave and 9.8 percent of the voltage appearing in the transformer . . . an accuracy more than adequate for design purposes. The tracings of typical oscillograms shown below were obtained between corresponding points of two transformers and their models. They show how closely the model predicts the electrical performance of the actual core-and-coils.

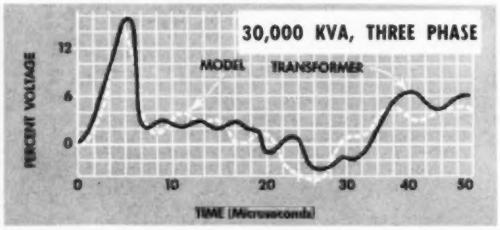
For more information on electromagnetic models, write to Section 421-2, General Electric Company, Schenectady 5, New York.



Chopped-wave impulse voltages across first duct from line end of high-voltage winding.



Full-wave impulse voltages to ground at 36% high-voltage winding from neutral.

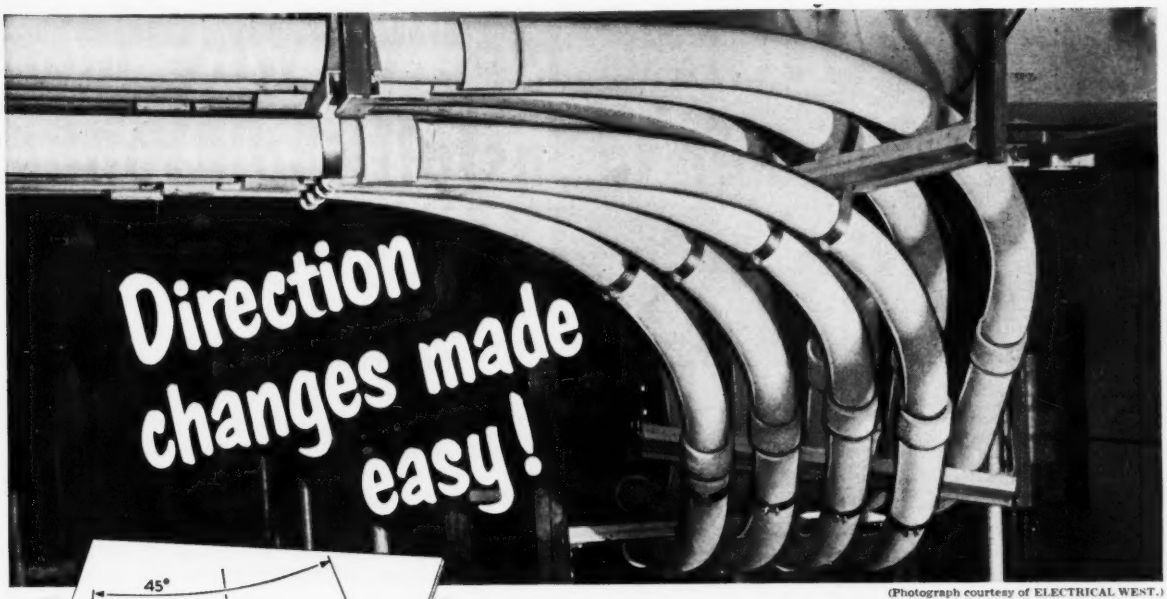


Full-wave impulse voltages across thirteenth duct from line end of high-voltage winding.

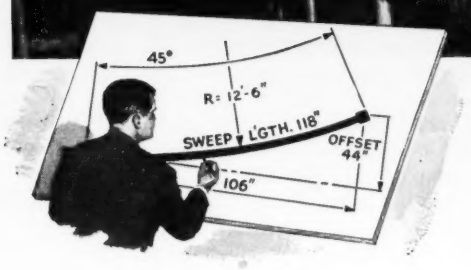
You can put your confidence in—

GENERAL ELECTRIC

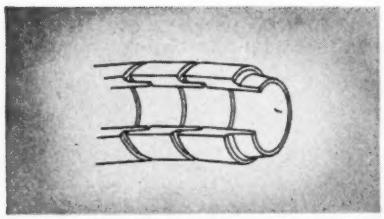
LITHO'D IN U.S.A.



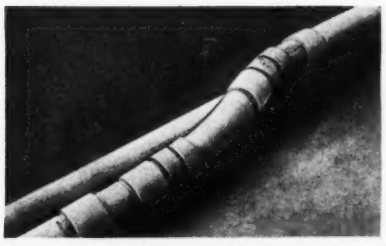
(Photograph courtesy of ELECTRICAL WEST.)



. . . with standard fittings for TRANSITE asbestos-cement DUCTS



5° bend segment sketched in detail. It consists of a straight section of Transite stock with a male taper on one end and a female taper on the other . . . each machined at an angle of 2½° to the center axis. Segments can thus be used single, or combined to form bend sections whose curvature is any multiple of 5°.



Photograph showing use of bend segments and curved segments with Transite Ducts.

When you use Transite Ducts, you have available a wide variety of standard fittings, made of the same asbestos-cement material as the ducts themselves. These fittings save time and expense because they provide maximum flexibility in laying out or constructing a duct system. They facilitate clearing unexpected obstructions or accommodating revisions in the original layout.

For instance, the new Transite 5° Bend Segments (shown at left) can be used alone to form simple and complex curvatures of any multiple of 5°. Used with other standard Transite curved fittings, they form curvatures of odd degrees. Thus, they enable you to simplify cross-overs and transformations . . . to clear obstructions . . . to form unusual or special bend or offset sections. They eliminate the need for purchasing special radii bends or sweeps.

The other standard Transite fittings that facilitate directional changes are the offset bends, standard 45° and 90° bends, sweeps, curved segments, laterals, tees, elbows and deflection couplings. These fittings are machined to a standard taper so that they can be used with Transite Conduit, Transite Korduct or with other Transite fittings.

For more information, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, address 199 Bay Street, Toronto 1, Ontario.

5 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. Corrosion-Resistant. Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.

2. Permanently Smooth Bore. Transite makes long cable pulls easy, under any conditions. Danger of damage to cables is also minimized.

3. Incombustible. Transite will not burn or contribute to formation of smoke, gases, fumes. It confines burnouts, will not soften under heat.

4. Higher Thermal Conductivity. Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

5. Easy to Install. Transite Ducts are light weight, easy to handle. Joints are quickly made. Long 10-foot lengths reduce number of joints in line.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE® DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

"Ampyrol is a type of wire more and easier to install than rubber It's the best kind we can get for

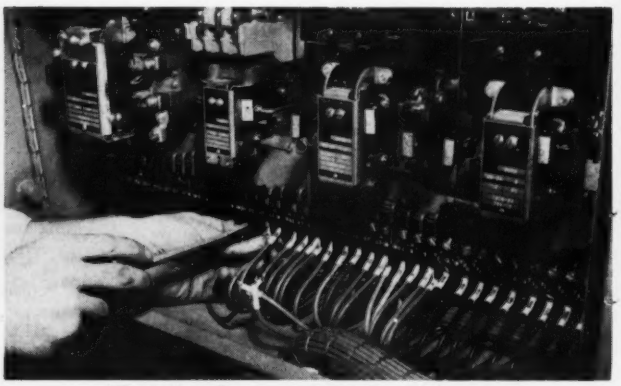
says NORTON COMPANY, world-famous manufacturer of

• Norton Company has very definite ideas about product quality. They've found, for example, that many of their customers use the same machine for 30 years, and these customers *expect* that kind of service from any product that bears the name "Norton."

They've found, too, that a great percentage of their customers are leaders in their fields, and these industrial giants simply cannot tolerate down-time due to machine failure.

As a result, Norton will accept nothing but the best—in design, manufacture, or component parts quality. A good example is their insistence on U·S·S Ampyrol or equivalent quality for the machine tool wiring. For instance, the Norton 10″ x 36″ type CTU grinder uses over 300 feet of this high quality oil-resistant wire.

In Norton's own words, "This type of wire is far better than rubber. It retains its insulation value and creates far less shock hazard. It seems to be completely impervious



"Thin jackets allow compact control panels."

A STANDARD Cable for every

- paper & varnished cambric cable
- asbestos wire and cable
- aerial, underground & submarine cable
- shovel & dredge cable

AMERICAN STEEL & WIRE DIVISION
USS TRADE MARKS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

U·S·S AMERICAN ELECTRICAL

durable, less bulky, insulated wire. our machines."

grinding machines and abrasives

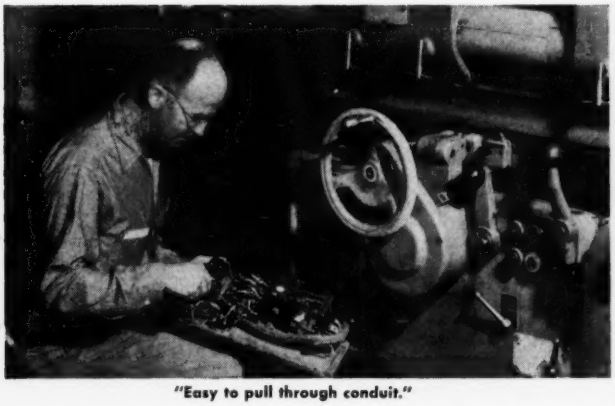
to oil, as well as water conditions. It does not leave a surface smudge and is very clean to work with.

"It is easy to pull through conduit because it's so thin, and it has allowed the design of more compact electrical control panels because it doesn't take up so much room. The jacket is so tough that cable lacing doesn't bite into it like it does with rubber insulation."

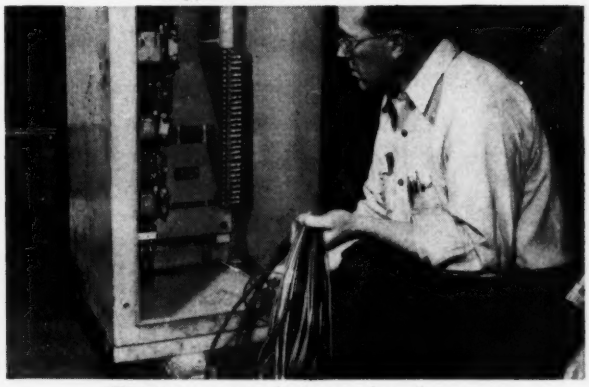
You may be able to replace *several* types of wire with U·S·S Ampyrol. The clean, easy-to-strip jacket is practically impervious to oil, grease, salt spray, industrial fumes, ozone and ultra-violet rays. Send the coupon and get the complete story on this all-purpose insulation.

AMERICAN STEEL & WIRE DIVISION,
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

"Ampyrol is far better than rubber."



"Easy to pull through conduit."



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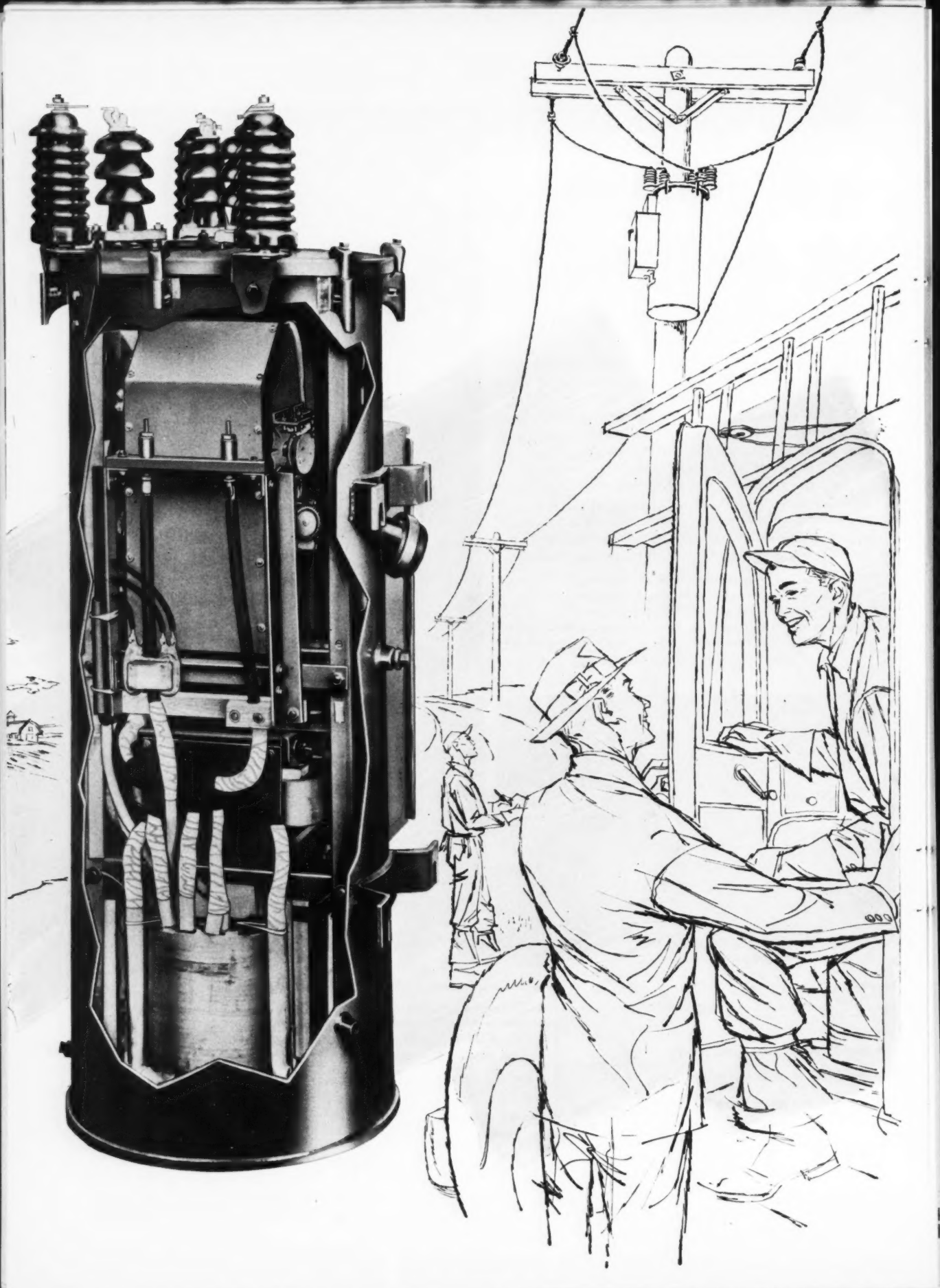

This 16 step regulator maintains close regulation with fewer operations...fewer moving parts!

We proved this fact in actual field tests! It was established conclusively that the Westinghouse URL-16 Step Voltage Regulator could maintain close regulation with fewer operations. Several URL-16 exclusive features contribute to its accurate performance.

- ***The CJ-1 Voltage Regulating Relay*** with simple adjustments for balanced voltage and band width, provides inverse time delay to automatically maintain a ± 1-volt band width.
- ***Positive arc interruption*** and minimum voltage variation result from the use of a simple quick-break, direct-drive Geneva-geared tap changer.

A simple design cuts maintenance costs!

The fundamental design of URL-16 reduces the number of parts necessary to complete a contact cycle. Only sixteen 1¼% steps cover the entire 20% range. Fewer operations indicate less maintenance. Also, the simple direct-drive Geneva-geared mechanism omits indirect drive devices which may require maintenance.

A simpler design means lower total cost. Fewer operations with fewer moving parts promise lower operating cost. That's why the URL-16 provides the most economical way to obtain close regulation . . . satisfied customers . . . increased revenues.

Get complete information

New Booklet B-5841 contains complete information on the URL-16 Regulator. For your copy contact your Westinghouse representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

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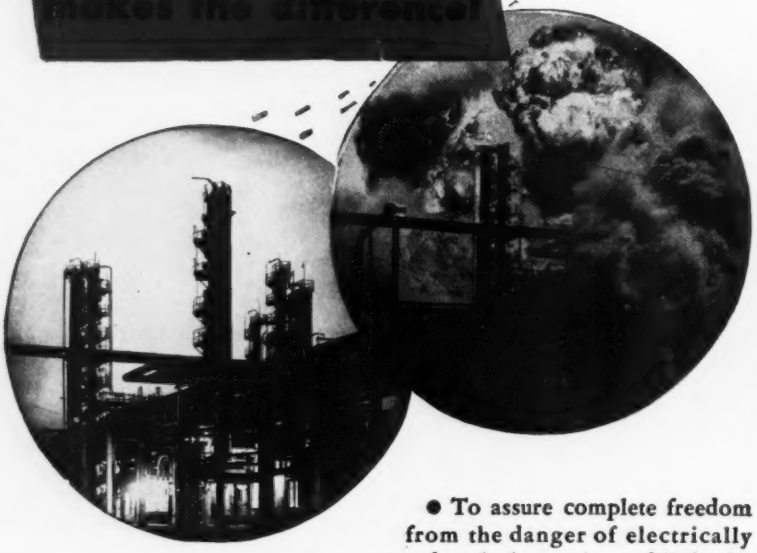

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These scientifically designed fittings and fixtures safely seal off the dangerous arcs that can spell disaster in the electrical circuits of oil refineries, chemical plants, hospital surgeries—any area where flammable dust, vapors or gases may be present.

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ELECTRICAL BOOKS

PRACTICAL ELECTRICAL WIRING, by H. P. Richter, fourth edition, 602 pages, 6x8, McGraw-Hill Book Co. Inc., $6.50. This edition emphasizes modern trends in wiring methods for residential, farm and industry use. Fundamentals, terminology, basic principles, theory behind practices and practical wiring instructions are based on the 1951 National Electrical Code. It is written in terminology for beginners, yet is complete enough for use by those already doing electrical work.

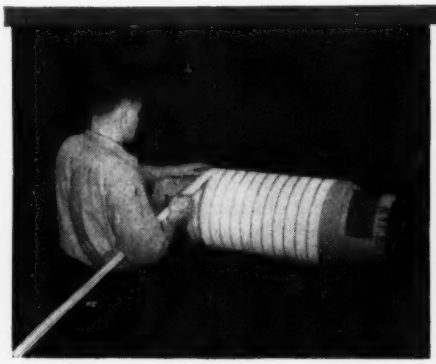
ESSENTIALS OF MICROWAVES, by Robert B. Muchmore, 236 pages, 6x9, John Wiley & Sons Inc., $4.50. Facts are presented, with illustrations, to enable the reader to understand microwave apparatus and its functions. Sections include empirical laws, electronic devices, illustrative applications of microwave equipment and measurement techniques. It may be used by the beginner or one who wishes a general review on microwaves. The final chapter on measurements interprets, describes and judges the phenomena and apparatus on the basis of measurements that can be made.

CONTROL OF ELECTRIC MOTORS, by Paisley B. Harwood, third edition, 538 pages, 6x9, John Wiley & Sons Inc., $7.50. This edition includes new information on circuits, devices and calculations used for regulating voltage, speed, tension, etc.; a new chapter on basic principles of regulating problems; new photographs; wiring diagrams. References have been revised and expanded. The book is arranged by motor types. It begins with a discussion of wiring diagrams, construction details and pilot devices as applied to motor control, then is divided into sections covering d-c motors and motor control, and a-c motors and their control.

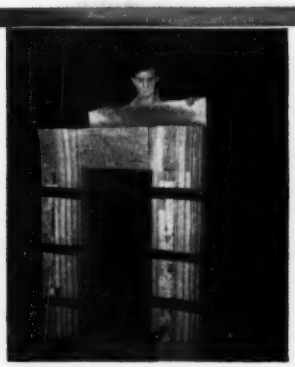
ELECTRICAL DEMONSTRATIONS YOU CAN PERFORM, a 32-page booklet available at $5 a hundred, to power suppliers, from School Service, Department T, Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa. A sample copy will be sent upon request. Wiring, small motor care, the care and use of home appliances, lighting and electrical farm equipment demonstrations are included. Sections tell where to look for material, how to prepare and points to consider in checking the demonstration. Procedures are outlined and illustrated.

METADYNE STATICS, by Joseph Maximus Pestarina, 415 pages, 6x9, Technology Press and John Wiley & Sons Inc., $9. This is a study of the group of machines to which Dr. Pestarina gave its name. He has been active in constructing the machines, is a lecturer at MIT and Columbia University. The book deals with theory, design and applications of metadynes, emphasizes the providing of specific characteristics particularly suited to each application. The first part covers general rules; the second part is devoted to special cases. The steady-state characteristics, referred to as metadyne statics, are presented in this volume, based on presentation of the material to graduate students.

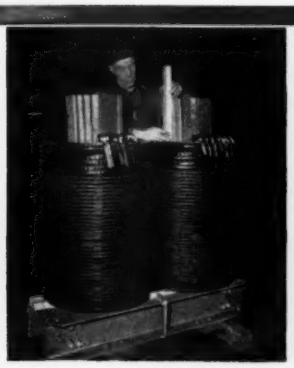
This is how *Kuhlman* craftsmanship assures you dependable transformers



1. The coils of Kuhlman power transformers are usually wound concentrically. Coils that are to carry heavy currents at low voltage are of the interleaved disc type. Above, a cylindrical LV core for a 1000 KVA transformer being wound with multiple wires transposed when necessary to maintain low stray losses.

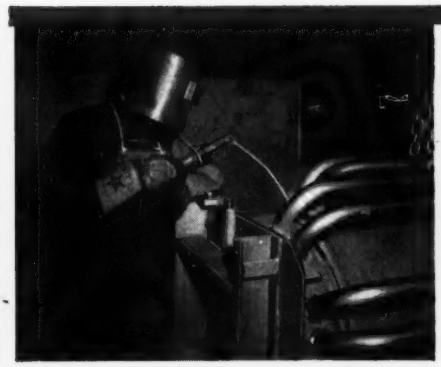


2. Assembling the core for a 1000 KVA transformer. After the assembler has finished inserting the laminations, the core will be inverted to receive the coils. The laminations are made of cold-rolled oriented silicon steel which permits the flux path to follow the grain of the steel producing high permeability and low hysteresis.



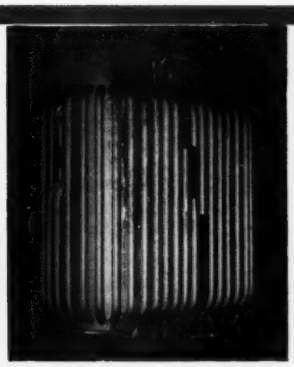
3. Here the core has been inverted and assembled to the lower part of the core clamp. The coils, which have been immersed in a thermo-setting varnish and baked, have been slipped over the legs of the core. The assembler is bracing the core to prevent shifting and vibration.

4. After the core has been braced, the assembler inserts the necessary laminations on top to complete the core. After this, the remainder of the core clamp will be assembled and the core and coil assembly will be ready to be lowered into the tank.



5. The tank is made of heavy steel plate, electrically welded at the seams. Here you see the cooling tubes being welded on the outside of a tank to provide oil-tight and rust-proof joints.

6. In this picture, the welded joints of the cooling tubes are being tested for leaks. After these tubes are put on the tank, the entire tank is filled with kerosene and subjected to air pressure as a final check to determine if the tank is completely oil-tight.



7. Finally, the entire tank is shot-blasted and painted with a coat of rust-inhibitive primer and two coats of corrosion resistant paint. The tanks are then ready to receive the core and coil assembly.

8. Kuhlman transformers are engineered for long life and dependability. They are built from carefully selected materials according to sound principles of design and assembled with infinite care and patience by skilled craftsmen with years of experience at their job. Then each transformer is thoroughly inspected and tested for safe, efficient performance. When you install your next transformer, specify Kuhlman for transformers of outstanding quality — backed by nearly 60 years of electrical manufacturing experience. Write us today for the name of your nearest Kuhlman representative.

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Stress relief cones reduce the unit electrical stress in the cable insulation at the end of the grounded sheath. They increase the overall internal dielectric strength and reliability of the cable termination.

Stress relief cones are recommended for all shielded cables and particularly for single conductor lead-covered and three-conductor shielded cables operating at 12 Kv. and higher voltages.

For compound-filled potheads on paper or varnished cambric insulated cables, a double cone is built up of half-lapped varnished cambric tape. The lower slope is wrapped with copper tinsel braid, tucked under the bell at end of lead sheath and soldered to the lead sheath and/or to the cable shielding tape. *On rubber insulated cables use Nozone rubber tape and TINNED copper tinsel braid.*

For gas and oil filled potheads, insulating tape is applied OVER the ordinary stress cone to compensate for the absence of solid compound and provide the necessary electrical strength.

Specify and order G & W POTHEADS with stress relief cone material in unit package kits. **The correct amount of proper tape and shielding braid is supplied in convenient form — clean, dry and ready for use. Varnished cambric tape and coppper tinsel braid is oil packed in sealed cans.**

G & W furnishes dimensions and instructions for stress relief cone installations, when requested on orders for potheads.

Send for Bulletin No. A52 which explains the theory of stress relief cones in potheads, and lists prices of unit kits for cables of various kinds and sizes.

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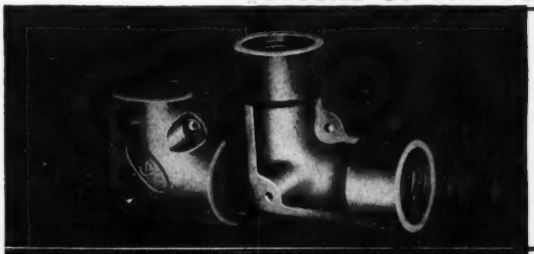
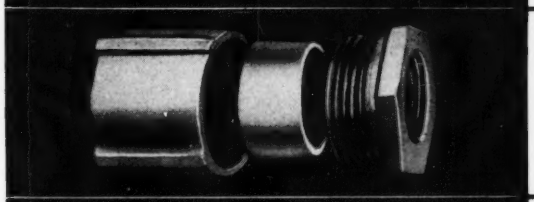
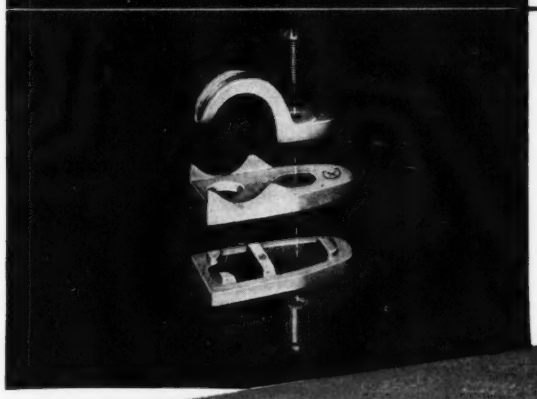


Corner Pull-In Elbows in ½", ¾" and 1" sizes. Ideal for space-saving, machine wiring, easy wire pulling. Cadmium plated.



3-Piece Conduit Couplings in a large range of sizes from ½" to 6". Cadmium plated.



One-Hole Pipe Straps, Clamp Backs, and the handy new Gedney Nest Backs. These supplementary spacers nest firmly behind the Clamp Backs—use as many as you need to hold pipe at desired distance from wall. Hot dip galvanized to prevent corrosion.

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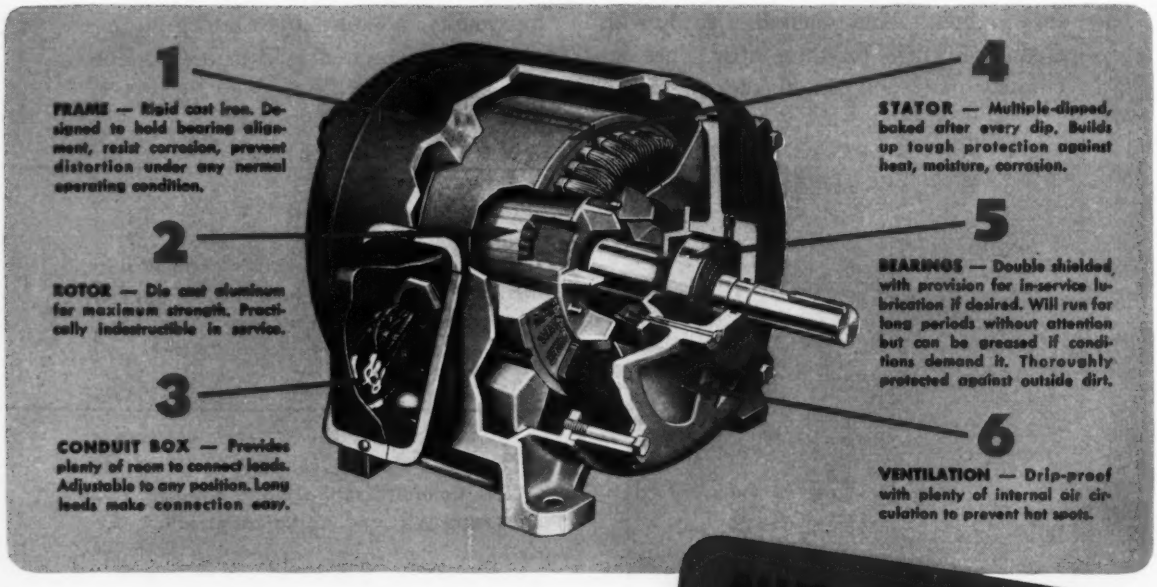
1
FRAME — Rigid cast iron. Designed to hold bearing alignment, resist corrosion, prevent distortion under any normal operating condition.
2
ROTOR — Die cast aluminum for maximum strength. Practically indestructible in service.
3
CONDUIT BOX — Provides plenty of room to connect leads. Adjustable to any position. Long leads make connection easy.
4
STATOR — Multiple-dipped, baked after every dip. Builds up tough protection against heat, moisture, corrosion.
5
BEARINGS — Double shielded, with provision for in-service lubrication if desired. Will run for long periods without attention but can be greased if conditions demand it. Thoroughly protected against outside dirt.
6
VENTILATION — Drip-proof with plenty of internal air circulation to prevent hot spots.

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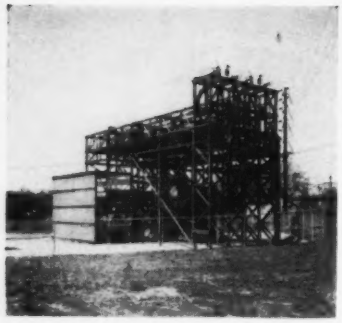

ENGINEERING NOTES

High Speed Camera Records Tests at Substation Laboratory

KEARNEY Test Engineers now use an ultra high-speed camera to photograph equipment undergoing actual short circuit test. If you have ever watched a fuse cutout clear a fault, for example, you know that the action happens too fast, with too much flash for the unaided eye to see. Yet design engineers must have a visual record of equipment operation in order to produce efficient, trouble-free apparatus. This new camera provides us with just such a graphic record.

Top speed of the camera is about 7000 frames or pictures per second. Two high-speed motors combine to pull a full 100 feet of black and white or color film past the aperture in 1.3 seconds! This means in effect that time is magnified by a factor of 200 when the developed film is projected at the normal rate of 16 frames per second. The film moves so rapidly through the camera that it is impossible to use a mechanical shutter. Instead, motion is stopped by refraction of light through a rotating prism synchronized with film travel.

This actual motion picture of equipment operation is carefully studied, analyzed and compared with oscillograph records in order to make certain that each Kearney Product is designed for maximum service life.

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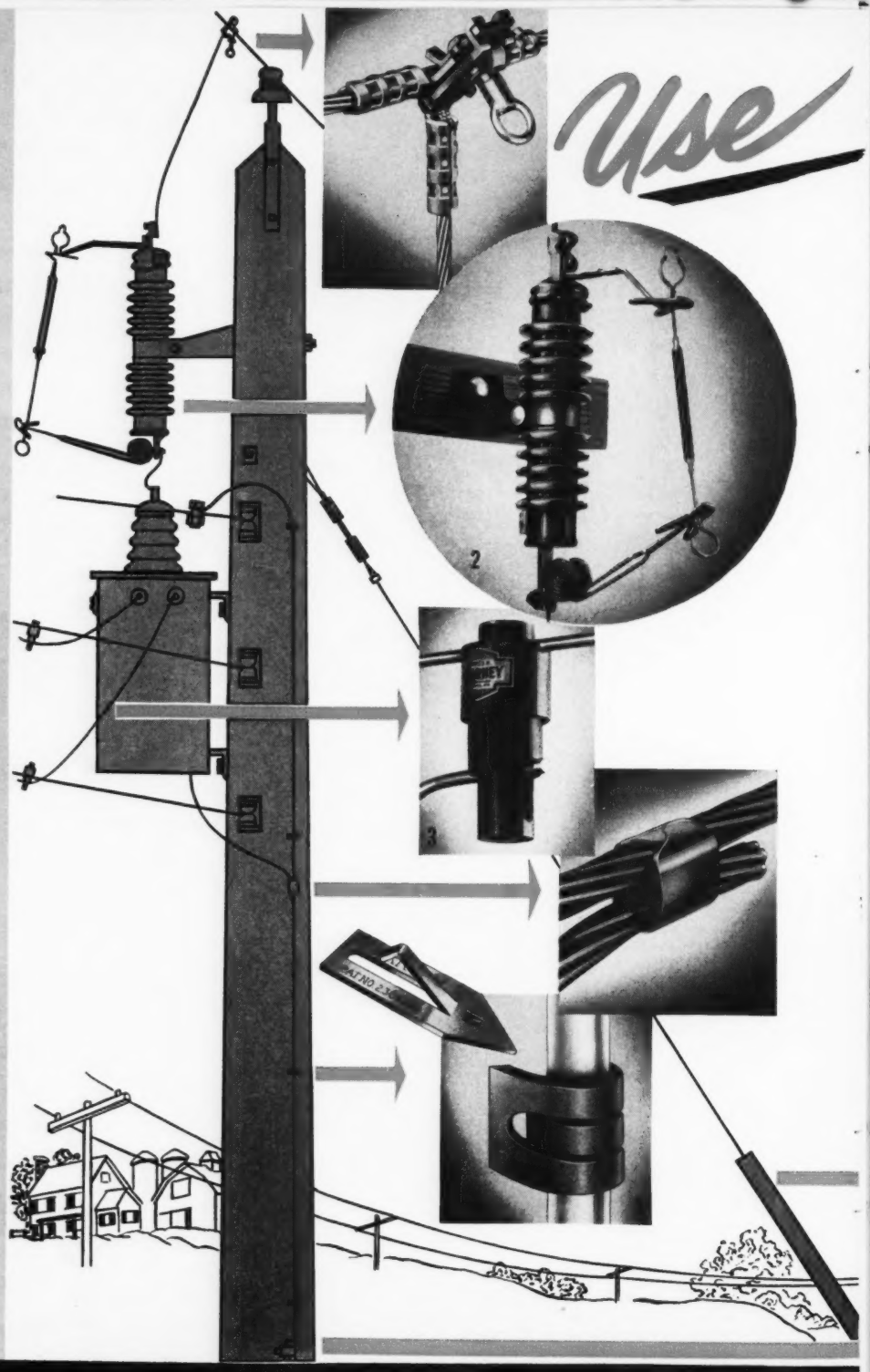

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1 Kearney Pressur-Tap Clamps — make permanent live line taps with no conductor pitting.

2 Kearney Trip-O-Link Fuse Cutouts — designed for full rated service 5 to 69 KV; up to 100 amperes.

3 New, Improved Secondary Cutout — protects transformers against excessive overloads or shorts in secondary circuits.

4 Kearney Squeezon Connectors — high compression connections eliminate oxidation at all points of contact.

5 Kearney Non-Static Ground Wire Clips — replace wire staples to eliminate radio and television interference.

6 Kearney Full-Vu Guy Guards — are full round — insure safety to live stock and pedestrians.

7 Squeezon Ground Rod Fittings — provide permanent, high conductivity ground connections.

8 Kearney Two-Way Expansion Anchors — expand 2½ times their rated size — meet all holding power requirements.

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for GREATER ECONOMY *in* RURAL DEVELOPMENTS

WHERE BUDGETS . . . and loads . . . are limited, these Kearney products go a long way in holding down distribution and maintenance costs.

The important thing to remember is that Kearney design engineers have reduced expense without forfeiting dependability. After all, a low first cost is false economy when you risk continuity of service as a result.

Take Kearney's malleable anchor for example. We all know that one insecurely anchored pole can cause thousands of dollars damage. It makes sense, then, to specify "Kearney Malleable" on anchor orders. When you do you're getting unlimited service life, and at low cost, too. Customers tell us that malleable iron outlasts all other construction materials. In fact, we have at our plant, an anchor removed from service after 21 years underground. After sandblasting we found that it is in almost perfect condition, good for many more years than the pole line will last. That's the kind of performance you count on with Kearney Malleable Anchors.

While we're talking about good service, have you seen our Squeezon Hydraulic Tool in action? This versatile, easy-to-use tool quickly makes tap connections, line splices or applies ground rod fittings. 20,000 pounds of force are used to make permanent connections that can't be beat for conductivity today, next month or 20 years from now. Ask your Kearney representative to demonstrate the tool for you.

The name "Kearney" is an old "stand-by" in rural construction. If you are planning any building or maintenance projects it will pay you to get in touch with the Kearney Corporation. We may have suggestions which will mean real savings for you.

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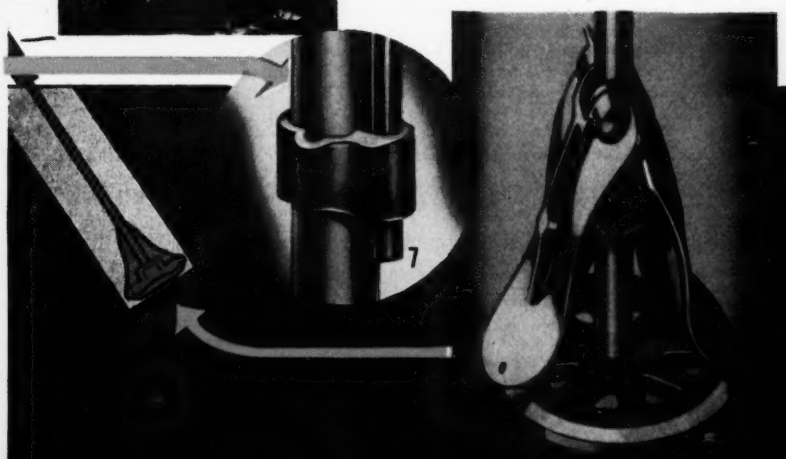

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Helipot achieves "HIGHEST PRECISION" with DRIVER-HARRIS RESISTANCE WIRE

Cutaway view of Model A 10-turn Helipot precision helical potentiometer. Resistance element 45" long is contained in case 2" x 1-13/16" diameter. On element are wound 3000 to 9800 turns of resistance wire, depending on total resistance value required. Adjustment accuracy is 12 to 14 times that of conventional single-turn potentiometer of equal diameter.

To win consumer preference and assure customer satisfaction, Helipot Corporation is guided by a basic policy that has proved as effective as it is simple. It is: (1) to produce components of the highest precision, and (2) to realize the economies inherent in mass production.

By following these objectives, Helipot has become the world's largest maker of precision potentiometers, producing the widest selection of single-turn and multi-turn units available anywhere.

States Helipot: "Our policy of mass producing the highest precision potentiometers practicable, in order to deliver top quality at moderate cost, is reflected in the fact that standard linearity accuracy of all our stock models, selling competitively, is held to $\pm 0.5\%$. Our reliance on Driver-Harris alloys such as Nichrome V, Advance, and Karma to provide resistance windings for many of our products constitutes a strong endorsement of Driver-Harris skills and reliability."

Driver-Harris takes particular pride in having played so important a role in the Helipot story, and is fully conscious of the responsibility the confidence of this famous manufacturer imposes.

Nichrome*, Advance*, and Karma* are at your service, too; as are more than 80 other alloys developed exclusively by Driver-Harris for application in the electrical and electronic fields. We feel confident that, like Helipot, you will realize outstanding advantages by putting one or more of them to work for you. Let us have your specifications. We'll be glad to make recommendations based on your specific requirements.

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For many years Contractors from Coast to Coast have used Briegel All Steel Indenter Fittings. U. L. approved as concretetight and for general use, B-M Indenter Fittings are faster, easier to use and neater in appearance.

Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

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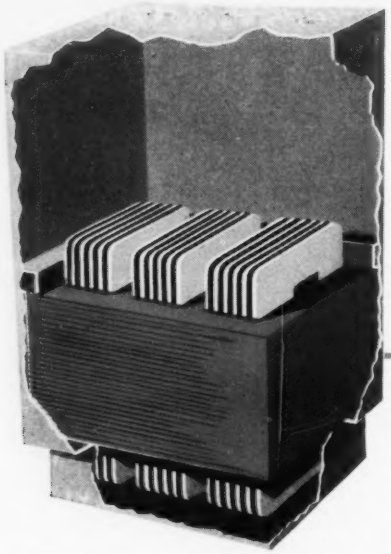
Distributed by

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Nikoh Tube Co., 5000 South Whipple St., Chicago, Ill.; Clifton Conduit Co., Jersey City, N. J.; The Steelduct Co., Youngstown, Ohio; Columbia Cable & Electric Corp., 255 Chestnut St., Brooklyn, N. Y.; Pittsburgh Standard Conduit Co., Pittsburgh, Penn.; Wagner Malleable Products Co., Decatur, Ill.; J. R. Richards Co., Carnegie, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.



This design

takes stress better

The Form-Fit design of Westinghouse Power Transformers has inherent advantages that no other transformer can equal for handling both surge and short-circuit stresses.

The fact that the winding contains only a few coils of large plate area, results in the best relationship between series capacitance and ground capacitance and gives, inherently, more uniform distribution of lightning surge across the winding. This construction eliminates the need for shields, arresters or other internally mounted protective devices likely to cause trouble. As a result, operating hazards are minimized . . . design margins and safety factors are increased.

Because short circuits set up, in all transformers, magnetic fields that tend to force high and low-voltage coils apart, Westinghouse Form-Fit Transformers are arranged with high and low-voltage coils interspersed, so that these forces, acting over broad areas, essentially balance each other and are reduced to absolute minimums. Furthermore, because the core surrounds, supports and protects the coils, the mechanical strength of the mass of core material is added to the strength of the case, providing an unbeatable combination to withstand all mechanical stresses.

To all this, add the advantage of more efficient cooling, and the saving in installation cost because they are smaller and lighter than any comparable transformer, and you'll quickly see why it pays to specify Westinghouse Form-Fit Power Transformers.

Ask your Westinghouse representative for further information, or write for Booklet B-4142A: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70643

YOU CAN BE SURE...IF IT'S
Westinghouse
POWER TRANSFORMERS

50,000-kva, 132-kv transformer installed at West Penn Power Company's Mitchell Station.

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Outdoor Lighting for Modern Plants featuring the HOLOPHANE A-WAY* POSTOP*

TITUS STATION
Metropolitan Edison Co., Reading, Pa.
Engineers: Gilbert Associates, Inc.

Installed 8' above platform
Spaced 12'-15' on centers

The A-WAY POSTOP serves a three-fold purpose for industrial plants: (1) Increased pedestrian and vehicular safety; (2) Protection against after-dark intruders; (3) Illumination of work locations . . . It provides rail-lighting for catwalks at outdoor boiler plants and oil refineries, also lighting for passageways, driveways and walks. Its distribution is asymmetrical, redirecting light usually wasted and adding it to required areas, with excellent uniformity. Sturdily built, totally enclosed, POSTOP is weather proof and designed for enduring, easily-maintained serviceability.

Holophane

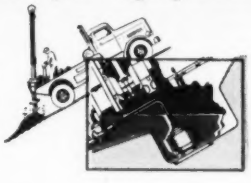
• Engineering Services are rendered, and recommendations submitted, without charge, through professional advisers.

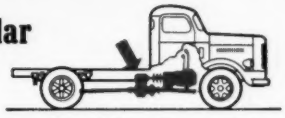
HOLOPHANE COMPANY, INC.
Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N.Y.
THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

To the job, on the job . . . year 'round FWD's speed work, cut your costs

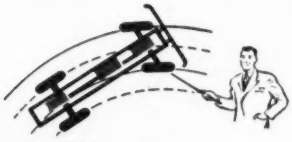
Check all these advantages and you'll see why FWD "Mobilized Tools" alone can offer so much per equipment dollar

High-Climb Oil Sump keeps oil pump constantly submerged. An FWD exclusive that lets you bore holes, set poles on steepest grades or slopes.





Two-Speed Aux. Transmission Doubles the number of transmission gear ratios. Provides low gear ratio for full power at extreme low speeds in tough, cross-country operations.



Full Torque P.T.O. . . . Utilizes full engine power through all transmission speeds. Exclusive safety lock prevents truck drive while boring.

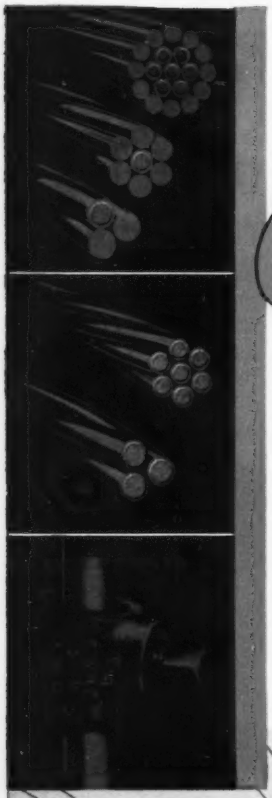
Fully Compensated Drive Three free-acting differentials compensate for differences in travel of all four wheels. Reduces drive line strains, eliminates needless tire scuffing.

With extra traction and "go everywhere" mobility FWD "Mobilized Tools" for line construction or maintenance pay off for you in speed . . . to the job . . . on the job. And, you'll get all-weather service . . . greater safety for crews and equipment . . . longer, trouble-free life. When you use FWD "Mobilized Tools," you deal with only one source for service and supply.

To get the facts . . . details on the more than 78 matched-combinations utilities can choose from . . . see your FWD Dealer or write direct.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wisconsin • *Canadian Factory*: Kitchener, Ontario

Built by the makers of America's Foremost Heavy-Duty Trucks



CUT OVERHEAD EXPENSE ON YOUR OVERHEAD LINES WITH Copperweld TRADE MARK

POWER CONDUCTORS

SHIELD WIRES

GUY AND MESSENGER STRAND

GROUND RODS AND CLAMPS

For over 37 years Copperweld* Products have provided dependable service to the Electrical Industry. Their trouble-free performance has been proved by time. Their lowest annual cost is a matter of record.

When you build with Copperweld Products, you get the long life and conductance of copper inseparably molten-welded to a core of high strength steel. And because Copperweld can't rust, this original high strength is retained for the life of the installation. This means your overhead lines will have the stamina to stand up under all types of operating conditions.

Profit by the experience of many of the world's leading power companies, railroads, and communication systems. Specify Copperweld Conductors, Shield Wires, Strand and Ground Rods for your overhead lines. There is no better way to keep the power load up, keep overhead down and be assured of constant, uninterrupted service. Write today for your copy of the Copperweld Engineering Data Book.

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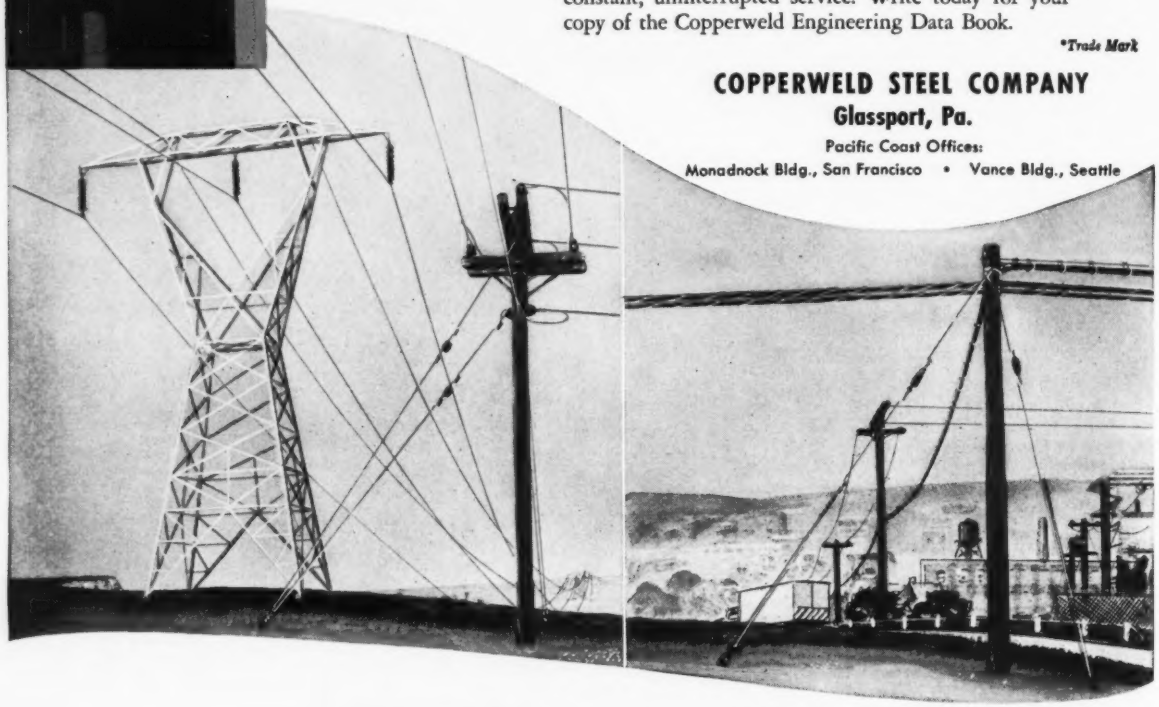
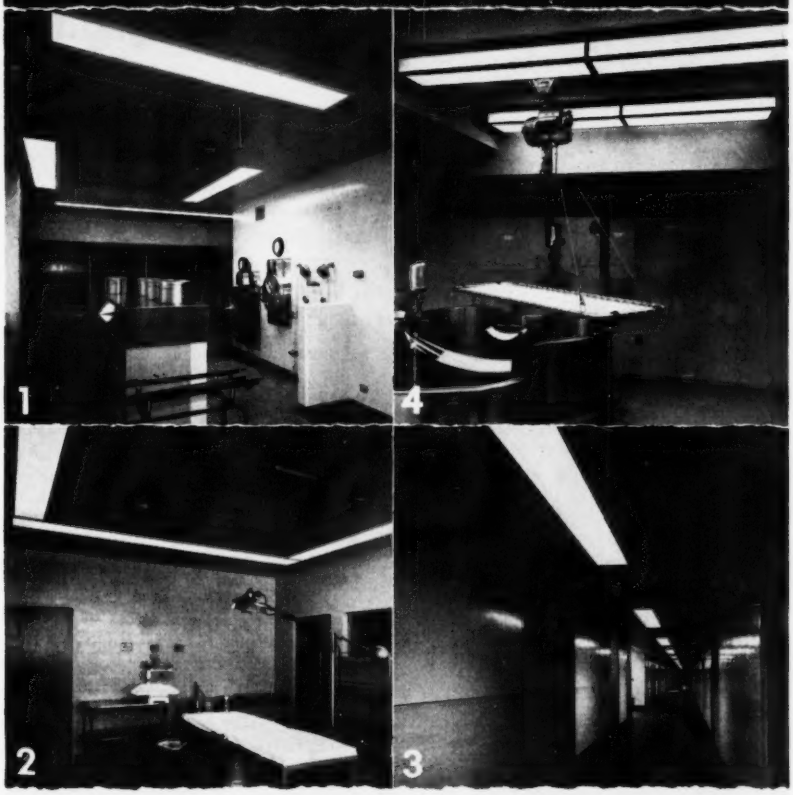


Copperweld TRADE MARK **PRODUCTS**

Cost Less BECAUSE THEY *Last Longer*

SUNBEAM visionaire LIGHTING COMPANY

WHEN LIFE DEPENDS UPON LIGHT----



Specify Sunbeam Lighting. Hospitals, more than any other institution, require dependable performance from all of its equipment at all times. Since proper illumination plays a major part in the optimum function of such an installation, it is no wonder that architects and contractors look to Sunbeam Lighting. They know that Sunbeam fixtures are certified by photometric tests and manufactured under rigid quality control.

Typical of many Sunbeam Lighting installations is the new Maternity and Pediatrics wing of the Cedars of Lebanon Hospital, Los Angeles, dedicated last November (views #1, #2 and #3). Nearly 600 #HLB5600-96, low brightness units were used for general lighting throughout the laboratories, surgical rooms, corridors and other work areas. Note view #2 how peripheral lighting was used to good advantage in reducing contrast. View #4 shows Sunbeam's fully-enclosed HCA1714-96 units in one of the physical therapy rooms of the Milwaukee Hospital Annex, Milwaukee, Wis. For Sunbeam's complete line of fluorescent and incandescent lighting fixtures see your leading electrical distributor.

SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21

NO DESCRIPTION NEEDED!

those who use **General** switches

know why...

they are without equal!

WRITE FOR CATALOG #5201

General
Switch Corp.
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ENCLOSED SAFETY SWITCHES
SERVICE ENTRANCE EQUIPMENT
BRANCH CIRCUIT PANELS

FREE booklet

answers 17 most frequently-asked questions about this label on industrial lighting units, such as:

Q What do the initials RLM stand for?

A The "R" stands for Reflector, the "L" for Lighting equipment and the "M" for Manufacturers—*Reflector* and *Lighting Equipment Manufacturers.*

Q How does the RLM Label assure conformance to RLM Standards?

A Representatives of the Electrical Testing Laboratories periodically visit the plants of all manufacturers participating in the RLM Specification-Certification Program. These ETL inspectors are authorized to take lighting units right off the assembly line or out of stock at random and make the required tests. They may also obtain test samples direct from distributors' stocks in order to check conformance to RLM minimum standards.

Q Who are the Electrical Testing Laboratories?

A Electrical Testing Laboratories, Inc., 2 East End Ave., New York 21, N. Y., is an independent testing organization which has conspicuously served industry for over 50 years. With this impartial and scientific organization rests the sole responsibility of determining whether or not an industrial lighting unit measures up to every individual quality standard that qualifies it to bear the RLM Label.

Q What are the 4 Basic Tests made by Electrical Testing Laboratories?

A (1) Quality of reflecting surface, (2) Reflection factor, (3) Shielding angle and reflector dimensions, and (4) Photometric test for light distribution and efficiency

Q What does the RLM Label stand for?

A The label affixed to a lighting unit certifies that the reflector meets the minimum specification and performance standards, determined and established by the RLM Standards Institute.

Q Who sponsors the RLM Standards Institute?

A Incorporated as a non-profit organization, the Institute is sponsored by 28 manufacturers who voluntarily elect to manufacture industrial lighting equipment in accordance with RLM Standard Specifications.

Q How are RLM Standard Specifications established?

A The RLM Technical Committee, with the counsel of outstanding illuminating engineers, continuously reviews present specifications and suggests improvements and prepares new specifications. The Committee's recommendations then are reviewed by the Board of Trustees and finally submitted to the Institute Members for ratification. The adoption of new specifications requires approval by at least 80% of the membership.

Q In addition to design and construction features that meet certain minimum standards, what else does the RLM Label assure the buyer?

A It provides the buyer with a warranty of uniform quality. In addition to the periodical inspections and tests made by the Electrical Testing Laboratories, the manufacturer warrants that every unit shipped by him meets the published specifications of the Institute.

Q How many different types and sizes of RLM Units are there?

A There are 18 basic types of RLM Units made by one or more of the 28 member-manufacturers. At present there is available a total of over 320 different makes and types of units which either bear the RLM Label or are on submittal for testing and certification at Electrical Testing Laboratories.

Q How may I obtain free copies of all existing RLM Specifications and a check list of RLM-Member Manufacturers?

A Send for the 48-page RLM Specifications Book and the new Question and Answer booklet. Write RLM Standards Institute, Suite 815, 326 W. Madison St., Chicago 6, Ill. Your copies will be mailed without cost or obligation.

RLM STANDARDS INSTITUTE
INCORPORATED
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R5370RR

Every year...more of the nation's power flows through I-T-E Isolated Phase Bus

Bus applications growing

In 1936, I-T-E pioneered the isolated phase principle of bus design. Every year since, I-T-E Isolated Phase Bus has delivered an ever-increasing percentage of the nation's generated power. Today, about 25% of total capacity flows through I-T-E Bus. Some 35 conductor-miles—280 installations—are now in service.

Reasons for growth

Generators are getting bigger and bigger. I-T-E Bus—with each phase completely isolated from the others—is perfectly planned for carrying the heavy currents generated by these power giants.

I-T-E engineers have long experience in applying generator leads in the country's largest power projects. In both installation cost and actual performance, I-T-E has established a record for economy that is hard to match.

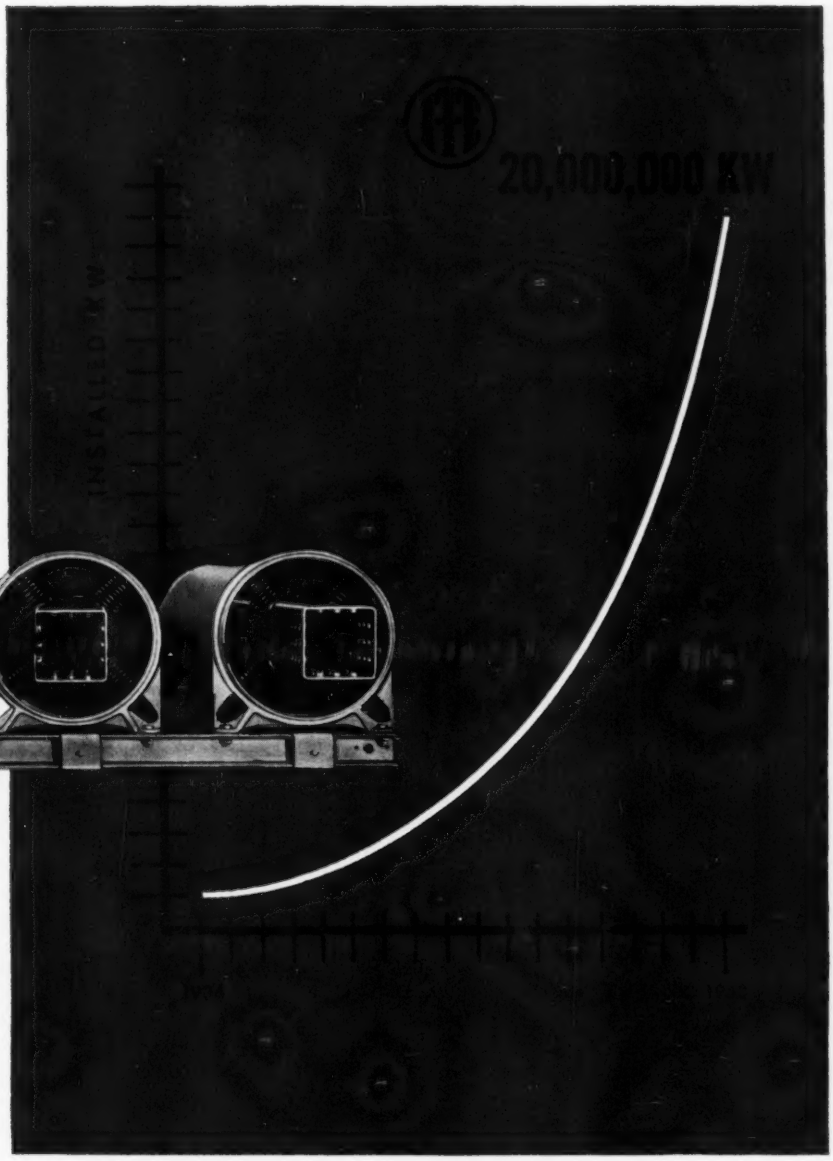
Design adaptability

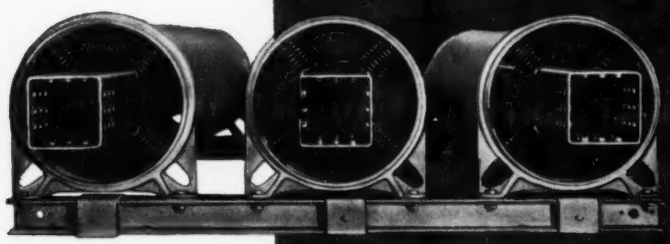
Simple construction makes it easy to adapt I-T-E Isolated Phase Bus to a variety of requirements. Indoors or outdoors, on long runs or short runs, it can be readily adapted to irregular building contours. Unit-welded sections reduce installation cost on straight runs. But complicated connections—even those necessary in existing structures—are all provided for in the standard I-T-E design.

Time-tested design

I-T-E's original design has survived the test of more than fifteen years. Today, I-T-E Isolated Phase Bus has become the generally accepted design for heavy power conductors.

A tremendous power growth is forecast for the years ahead. I-T-E is prepared to meet this challenge and to serve the power industry with design experience and production capacity.





Now installed . . .

in voltages up to 69 KV

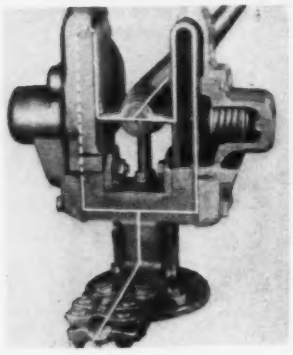
in current ratings up to 7000 amperes

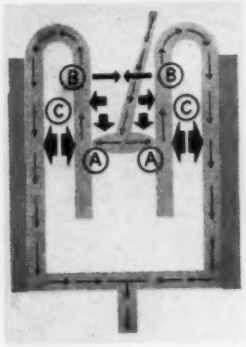
ISOLATED PHASE BUS

I-T-E CIRCUIT BREAKER COMPANY • 19th & Hamilton Sts., Philadelphia 30, Pa.

R&IE R&IE EQUIPMENT DIVISION, Greensburg, Pa.

PRODUCT NEWS





Air Break Switch

(1) Southern States Equipment Co., Hampton, Ga.

A new air break switch contact design utilizes the magnetic fields surrounding current-carrying members to effect higher contact pressure. Called Amplitact, the contact responds to any increase in current flow with a proportionate increase in contact pressure, resulting in greater current-carrying capabilities, the manufacturer states. Under fault conditions extremely high contact pressures are developed, it is stated.

The unit employs spring pressure for normal current plus pressure generated by magnetic forces, thus giving it ability to withstand greater fault current. According to the manufacturer, tests have demonstrated withstanding fault current in excess of testing equipment capabilities.

The Amplitact is now available on heavy-duty type WAG switches where short circuit requirements exceed capabilities of standard switches.

Electrified Steel Panel Subfloor

(2) National Electric Products Corp., 411 Seventh Ave., Pittsburgh 19, Pa., and Detroit Steel Products Co., 2252 E. Grand Blvd., Detroit 11, Mich.

Fenestra-Nepco electrifloor, an Underwriters' approved subfloor, permits installation of electrical outlets in each square foot of space. Of cellular, light-gage steel construction, the floor also was tested under direction of the American Iron & Steel Institute. Underwriters' tests simulated abusive treatment the prefabricated panels might experience during shipping, installation and use in the field.

A header duct system with conductors running through the cells of the floor was designed by National Electric. Enclosed cells are said to give smooth, clean raceways. Maintenance costs from insulation wear, dampness or mechanical injury are eliminated by a butt closure method of sealing the installed floor, it is stated.

Savings in steel, concrete and other materials are claimed for the system. The subfloor is composed of unit panels that can be welded together in any combination desired. Each of the panels may be carried by two workmen and working traffic is possible on the floor during installation, according to the manufacturers.

Signaling System

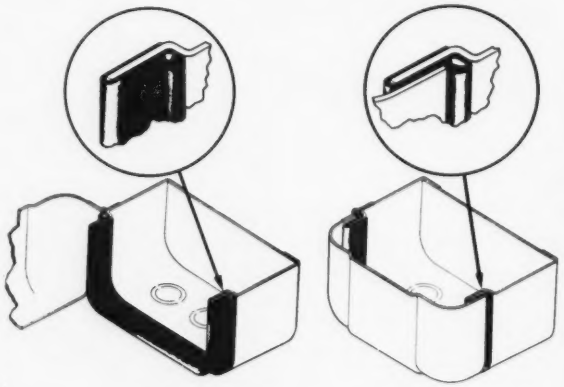
(3) Motorola Inc., 4545 Augusta Blvd., Chicago 51, Ill.

A single-tone selective signaling system has been designed for use in conjunction with any communication medium, two-way radio, land lines, microwave or power line carrier.

Function of the system is to allow any operator to initiate an operation at one or more remote points through an intervening communication medium. The operation may be the selection of a particular receiver or group of receivers from many in a system, the selection of a particular relay transmitter, illumination of a particular lamp on an indicator panel, sounding of a particular alarm—any operation that can be remotely controlled by a relay.

The four basic components to the system: 10-button selector box; single-tone oscillator; three-frequency switch kit; single-tone decoder.

The oscillator and decoder are small to permit installation within the VHF radio equipment cabinets. The switch kit is designed for mounting on the control panel of a mobile installation.



Cover open Cover closed

Enclosure Makes Control Lint-Tight

(4) General Electric Co., Schenectady 5, N. Y.

A NEMA 1-A enclosure, being used to make the manufacturer's a-c combination motor starters lint-tight, features an oil-resistant rubber gasket that is preformed to fit over the edge of the control case. When the cover is closed, the gasket acts as a seat for it. A close seal is thus formed, preventing the entrance of lint and minimizing fire hazard, the manufacturer states.

The U-shaped gasket forms a compression seal that can be inspected easily without opening the control case, it is stated. To further insure against lint, a gasket for the reset button is provided and small drain holes that may remain in the case after fabrication are sealed with a metal filler.

This enclosure conforms to all requirements of the 1951 revision of the NECode.

ICE CAN MAKE A HOT LINE COLD

IF SUSPENSIONS CAN'T STAND THE STRAIN!

Purified Porcelain is good insurance against the hazards of winter. This finest insulator porcelain ever made has unequalled ability to stand stress and strain. Cement is specially compounded and caps and pins are scientifically designed for maximum strength. Victor insulators withstand pull of ice, snow, high winds and endure thermal variations far above NEMA standards. For engineering data on these and other Victor *Purified Porcelain* insulators, send for Bulletin No. 4.

Every Victor Suspension Insulator undergoes this routine tensile test before electrical flashover test.

FREE BOOKLET gives you the full story on how Victor Insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

VICTOR NO. 900 SUSPENSION

Specify VICTOR INSULATORS

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain

Why PHELPS DODGE ROUND THE YARDSTICK FOR

✓ Up-to-the-Minute Research
✓ Quality Controlled for Maximum Performance
✓ Leader in Application Engineering
✓ Experience Over Complete Range— #4 to #44, AWG—All Grades and Colors

"It takes the best

PHELPS DODGE COPPER PRODUCTS CORPORATION

FORMVAR has become FILM WIRE QUALITY!

PHELPS DODGE, recognizing the advantages of round Formvar magnet wire, became the leader in replacing enamel, fabric and paper-covered wires. Today, round Formvar is used extensively in motors, transformers and coils, with resultant overall cost reductions and quality improvements in the insulation system.

Where greater spacing or additional safety factors are indicated, fabrics such as cotton or paper can be added. For higher temperature operation Phelps Dodge Formvar, with a wrap of fiberglass, has been widely used.

For some applications a thin sheath of Nylon has been applied over the Formvar and identified as Phelps Dodge Nyform magnet wire.

★ ★ ★

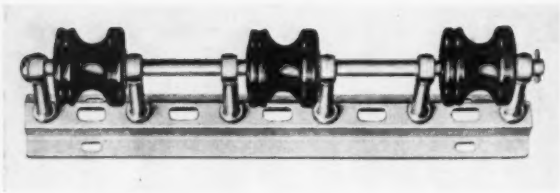
Any time magnet wire is your problem, consult Phelps Dodge for the quickest, easiest answer!

to make the best!"

PHELPS DODGE COPPER PRODUCTS CORPORATION

INCA MANUFACTURING DIVISION

FORT WAYNE, INDIANA



Secondary Racks

(5) Line Material Co., Milwaukee 1, Wis.

A new line of light-, medium- and heavy-duty secondary racks conforms with EEI Specification TD-7.

The medium- and heavy-duty types have a forged-leg design said to eliminate all pockets that would otherwise collect moisture and possibly produce corrosion. The medium-duty rack has sufficient strength for most urban area construction jobs, it is stated.

All edges are smoothly rounded to eliminate danger of damage to rope lines and conductors and they are hot-dip galvanized.

These racks are available for two, three or four wires, with extended or nonextended back, with spacings of 4, 8 or 12 in.

Radiant Heating Panel Can Be Cemented to Ceiling

(6) United States Rubber Co., Rockefeller Center, New York 20, N. Y.

A Uskon panel that can be cemented to the ceiling like wallpaper is designed to provide radiant heating for an entire house or for a single room. It is made up of a sheet of conductive rubber sandwiched between layers of thin plastic and aluminum foil; is only 1/16 in. thick and weighs 6 oz per square foot.

The panels are bonded to ceilings of plaster, sheetrock or similar smooth material by means of a special adhesive. Occasionally molding is used in conjunction with the adhesive. Panels may be attached without cutting or making structural changes and are then painted.

Number of panels required is determined by climate, insulation and other factors but, according to the manufacturer, Uskon generally does not cover the entire ceiling.

Three sizes are available: 4x6 ft; 4x4 ft; 3x4 ft and both outer surfaces are covered with aluminum foil to keep out moisture. Panels are rated at 22 w per square foot (75 Btu) and come for either 115 or 230 v. Absence of abnormally high temperatures at concentrated points eliminate hazards from burns and scorchings, the manufacturer states.

Surface temperature of the ceiling panels averages about 100° and the heat rays warm the floor and other objects in the room without heating the air, it is pointed out.

Capacitor for Secondary Network Systems

(7) General Electric Co., Schenectady 5, N. Y.

A 7.5-kvar capacitor is designed for economical application to network systems rated 208 and 216 v; is built for operation in ambient temperatures as high as 55 C. This unit can be installed on a vault wall above transformers and other equipment or on the ceiling or floor. It weighs less than 75 lb and can be installed without special handling equipment or removal of vault slabs, the manufacturer states. Hangers for six units, designed for placement of the capacitors above transformers on a vault wall or on the cover of a transformer, are also available. The hangers are arranged for use of fuses.

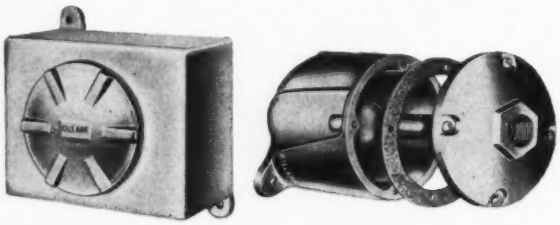
Plastic-Insulated Cable for Street Lighting

(8) Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

A plastic-insulated pole and bracket cable is now available in addition to rubber-insulated construction for street-lighting service. Voltage ratings of the new cable is 600 v between conductors; 6,000 v from conductor to ground. Other voltage ratings can be supplied on request. Construction consists of two flexible stranded conductors, each insulated with Densheath (PVC), one black and one white, laid parallel, with black polyethylene jacket. Finished cable is oval-shaped and comes in the following sizes:

2/C, No. 10 AWG, 19 strands	0.43x0.64 in.
2/C, No. 8 AWG, 37 strands	0.46x0.71 in.
2/C, No. 6 AWG, 37 strands	0.50x0.81 in.

According to the manufacturer, termination method must assure adequate protection from heat and manufacturers of lighting fixtures have available suitable heat barriers and conductor separators for use at lamp terminals.



Electrical Fittings Added to Line

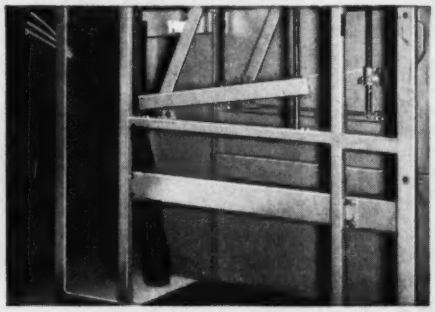
(9) Killark Electric Mfg. Co., Vandeventer and Easton Ave., St. Louis 13, Mo.

Two items have been added to this manufacturer's line—a large-size explosion-proof junction box, type GRJ (left above) and the series VLJ vapor-tight box (right).

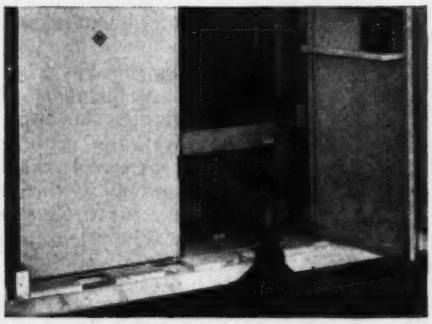
The explosion-proof box measures 10x8x5¼ in.; is constructed of Alumalloy, a rustproof and corrosion-proof material said to be nonsparking, strong and light weight. This box will take conduit up to and including 3-in. sizes. It can be supplied with hubs in any location. The large, open cover design permits easy installation and quick splicing, the manufacturer states.

All members of the VLJ are 4 in. in diameter, with models from 1⅝ to 3½ in. deep to give ample wiring space. Each can be furnished with a blank or hub cover or with an adapter plate designed to take the manufacturer's vapor-proof lights or any outlet box device for 3¼ or 4 in. outlet box. These boxes are of Alumalloy and will take up to 1-in. conduit sizes.

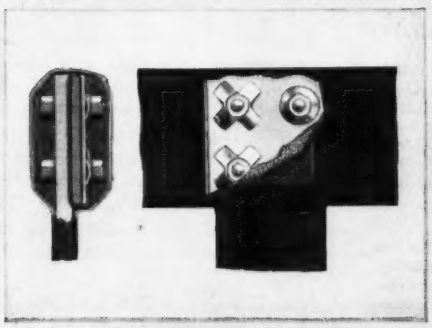
For Additional Information Fill in the Coupon on Page 78



1 PLACING switchgear over floor cable is done without lifting cubicles because A-C engineers designed the cubicle so that it simply slides into place.



2 MOVING is an easy job even if there's no crane or overhead space. Installation-wise A-C engineers built in provision for jacking all indoor switchgear units.

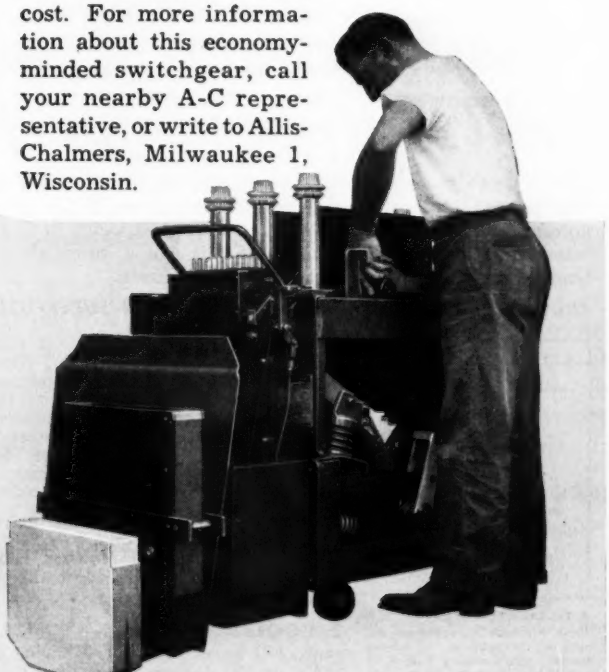


3 JOINING buses need no longer be a long, time-consuming job. Joint is bolted; then, no-corona tape is placed over bolt heads and nuts. Next, a molded Neoprene boot is slipped over the joint and taped in place. No fuss, no muss, no liquid compounds to worry about.

METAL-CLAD Switchgear

4 REASONS Why It's EASY TO INSTALL

EACH of the accompanying pictures shows one way in which Allis-Chalmers switchgear simplifies installation. These and other carefully engineered details cut installation time and cost. For more information about this economy-minded switchgear, call your nearby A-C representative, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.



4 INSPECTING contacts and arc chute during and after installation is only a three minute job with latest Allis-Chalmers circuit breaker. Only one nut to take off and all barriers can be lifted right out.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

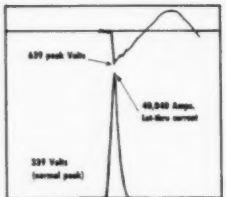
A-3930

Interrupting Capacity Rating in excess of Underwriters' Laboratories Standards is established by tests conducted in accordance with AIEE Standards #25 on Power Fuses and NEMA Standards on Power Fuses.

SHAWMUT'S NEW TRI-ELEMENT *All-Purpose Superfuse*

Here is a newly designed All-Purpose Superfuse. Use it wherever you need One-Times, Renewables or Dual Element fuses. Tri-onic is the first low voltage fuse with a published interrupting capacity of 25,000 Amps. at rated voltage for fuses. This is 15,000 Amps. more than required by Underwriters' Laboratories Standards for fuses.

TRI-ONIC, THE NEW TRI-ELEMENT SHAWMUT SUPERFUSE COMBINES:


339 peak Volts
49,040 Amps.
339 Volts
(normal peak)
.0035 sec.
TRI-ONIC, 200 Amp. 250V., interrupting 111,000 Amp. R.M.S. Short-circuit @ 240 Volts 60 Cycles.

A TRI-ONIC FOR EVERY CIRCUIT
These new high I.C. protective devices are available in 141 normal current ratings, ranging from 1/10 to 600 Amps. for both 250 and 600 Volt circuits. For safety's sake insist on Tri-onic. Protect yourself and your circuits. Send for Tri-onic Bulletin now.

1. HIGHER I. C. 25,000 Amps. @ 250V and 600V. It can handle short-circuits 2½ times larger than ordinary fuses. Tri-onic expands fuse application into the 25,000 Amp. zone with the same interrupting rating and time-current characteristics as 25,000 Amp. molded case air circuit breakers. Buy Tri-onic for bus plug-in duct, bus-ways, feeders, motor control panels and branch circuits.

2. LONG TIME DELAY, based on heat absorption principle, permits Tri-onic to safely start heavily loaded motors without blowing. Eliminates needless "outage" of circuits due to heavy inrush currents or load swings.

3. COOLER due to Tri-onic's inherent low resistance. I^2R losses very low. Blowing temperature is 286°F or 500 degrees lower than that of ordinary zinc links. Use it for distribution boards, panel boards, motor starting panels, knife and enclosed switches.

OUR 60 YEARS FROM EDISON TO ELECTRONICS

Tri-onic – *"Awake At The Switch"*

THE **CHASE-SHAWMUT CO.**

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Amptrap Tri-onic -td- C-Q-T Trionet ONE-Q-T FUSE WIRE

Torch Kit

(10) Appleton Electric Co., 1701 W. Wellington, Chicago, Ill.

The new Prepo master torch kit is a heavy-duty professional torch with six interchangeable burners and tips packed in an all-metal carrying case. The torch is compact but gives a hot flame temperature; maintains constant full flame regardless of position in which it is held, the manufacturer states. Fuel is in a replaceable tank that can be thrown away when empty.

Tips include a heavy-duty burner for greater heat volume; utility burner for general-purpose work; pin point burner for precision soldering; paint remover tip; diamond point solder tip for fine, quick work; chisel point solder tip for fast, heavy-duty service.

Counter

(11) Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.

A general-purpose photoelectric counter set, this PIC unit consists of a control, light source and electric counter. Control and light source are located at point of count. One or more electric counters may be placed at any convenient location and wired to the control for remote counting. The set is packaged and is said to be easy to install. Details are in bulletin PA506.

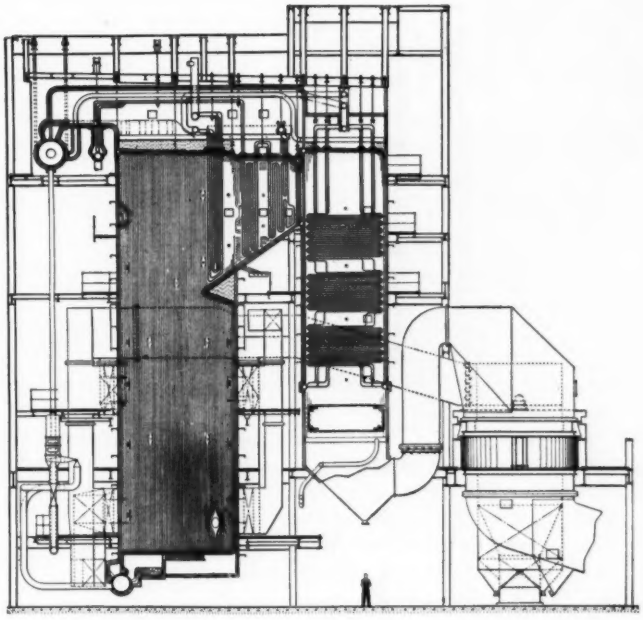
(12) **WIRING DEVICE**—Royal Electric Co. Inc., Pawtucket, R. I., has added three-wire turn-and-pull Royalok polarized caps and connectors to its line. These devices have adjustable cord grips for cord diameters from .325 to .562 in. and are used primarily with heavy-duty, rubber-jacketed service cords. They are UL listed, rated at 20 amp, 250 v; 10 amp, 575 v and will fit other standard makes of interlocking devices. The three-wire cap is No. 83, the connector, with Bakelite body, No. 93.

(13) **EARTH DRILL**—Buda Co., Harvey, Ill., has announced its model Y-1 self-powered, portable earth drill, which will drill from 6 to 36 in. in diameter and up to 12 ft in depth. It can be set up to drill vertical or angle holes. Adjustments are hydraulically controlled.

ETIWANDA STEAM STATION

Southern California Edison Company

C-E controlled circulation boilers



The C-E Unit shown above is one of two duplicate units now in process of fabrication for the Etiwanda Steam Station of the Southern California Edison Company at Etiwanda, California. Stone & Webster Engineering Corporation are the engineers and constructors.

Each of these units is designed to serve a 125,000 kw turbine-generator operating at a pressure of 1800 psi with a primary steam temperature of 1000 F, reheated to 1000 F.

These units are of the controlled-circulation, radiant type with a reheater section located between the primary and secondary superheater surfaces. An economizer section follows the rear superheater section and regenerative type air heaters follow the economizer surface.

Oil or natural gas firing is employed using tilting, tangential burners. The design provides for future conversion to pulverized coal when and if desired.

COMBUSTION ENGINEERING—SUPERHEATER, INC.

200 Madison Avenue, New York 16, N. Y.

Western Division: Los Angeles, San Francisco, Seattle

B-591

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

In the Carbon Brush field the 19-E Ohio Carbon Catalog has become a must throughout the passing years. It is completely illustrated, and under each category lists every conceivable type of motor and generator brush for all popular motors up to 5 H.P. YOU CAN'T AFFORD TO DO WITHOUT IT! Send for it now! A request letter on your Company stationery will be given prompt attention.

Send for our other Reference Books in your category:—Industrial, Mining, Welding, Transportation, Carbon Specialties.

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

THE OHIO CARBON CO.
12508 BEREA ROAD
CLEVELAND 11, OHIO

Microwave Equipment

(14) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A 2,000-mc microwave system recently introduced utilizes microwave radio (type FR) and frequency-division multiplex equipment (type FJ). The microwave carrier is divided into 30 voice channels or equivalent telegraphic functions (15 per voice channel) by the type FJ multiplexing equipment. Basic units of the microwave radio equipment are the same for both terminal and repeater station assemblies and require a single fixed rack or cabinet. Complete point-to-point systems are offered, including all types of interconnected terminal equipment.

Hydraulic Lift

(15) Hamlin-Klock Corp., 28 N. Marengo Ave., Pasadena 1, Calif.

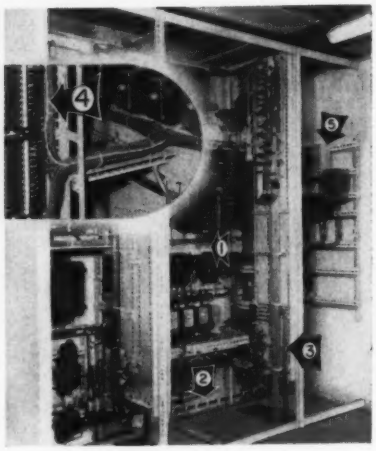
For mounting on truck chassis, this hydraulic maintenance lift has a lift of 30 ft, a 4x11-ft platform, 800 lb capacity. The lift mounts 2 ft from one end of the truck leaving a 9-ft overhang. Platform is mechanically rotatable through 360°, has a 42-in. collapsible guard rail and a kickboard all around to prevent loss of tools. For special conditions maximum heights to 65 ft can be provided.

(16) TEST UNIT — A cable faultfinder and d-c proof test unit recently introduced is an impulse or surge generator operating to test various types of cables. A loud cracking noise like a pistol shot is produced at the location of the fault. This noise is repeated at intervals of approximately 1 to 3 seconds. With the impulse applied to the cable, which has been disconnected from the system, the operator follows the route until he can locate the exact spot. Made by the Electrical Distributors Co., Liberty Trust Bldg., Philadelphia 7, Pa.

(17) TEST JACK—The new skirted test point jack, 110BCSH, is claimed to permit safe circuit voltage readings up to 3,000 v a-c peak from the front of equipment panels. Its high collar protects operators from flashover during high-voltage checks, according to the manufacturer, Alden Products Co., 117 N. Main St., Brockton, Mass., who states that actual flashover breakdown to chassis occurs at 7-8,000 v a-c, rms.

(18) RELAY—An overload relay combining high speed under dangerous conditions with time delay for starting inrush has been announced by Heinemann Electric Co., 327 Plum St., Trenton 2, N. J. This type C Silic-O-Netic relay can be furnished with time delay curves to match the characteristics of the protected equipment.

(19) NONCONDUCTING PAILS — The Ace-Hide pail, made of a high-strength rubber plastic blend, is for use around power lines and electrical equipment. Made by American Hard Rubber Co., 93 Worth St., New York 13, N. Y.



(20) Bailey Meter Co.'s control board features greater accessibility and flexibility as a result of design improvements made over the past several years. Features pointed out by the manufacturer are: (1) accessibility provided through vertical support areas; (2) control room floor openings and external tubing and wiring conduits may be completed in advance of panel installations; (3) tubeways provide centralized distribution points; (4) wireways enclose well-marked, compact and accessible terminal blocks; (5) adjustable wall racks facilitate mounting of any make control boxes, alarms, relays, breakers, etc. Details may be secured from the manufacturer at 1050 Ivanhoe Road, Cleveland 10, Ohio

(21) TESTER — A pocket-size Test-Glo has been announced by Ideal Industries Inc., 1042 Park Ave., Sycamore, Ill. It can be used for checking electric circuits, spark plugs, motors, fuses and other electrical equipment. Capacity includes voltages from 80 to 600, a-c or d-c. Safety features are incorporated.

(22) CABLE REEL—A spring retractable reel for electric cable can be supplied for handling up to 150 ft of multiple-conductor rubber cable in sizes up to No. 4. Details on Spring-O-Matic Powereel may be secured from Industrial Electrical Works, Department 65a, 1505 Chicago St., Omaha 2, Neb.

(23) SOLVENT—The Shaler Co., Waupun, Wis., has a product to clean electric motors and generators while they are still assembled. It is listed under the re-examination service of Underwriters' Laboratories.

(24) BROODERS — New infrared heat lamp brooders have been announced by Steber Mfg. Co., Broadview, Ill. The new types, in single-, three-, four- and six-lamp models, are Underwriters' listed. Details in bulletin 130-53.

(25) INSECT LAMP — A lamp claimed to destroy insects within an area of 15,000 cu ft is made by Solar Electric Corp., Warren, Pa. It glows in operation but cannot overheat, according to the manufacturer. The device is 6 in. high and comes with a skirted brass base that fits any standard outlet.

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Heavy Duty RPM Motor Oil

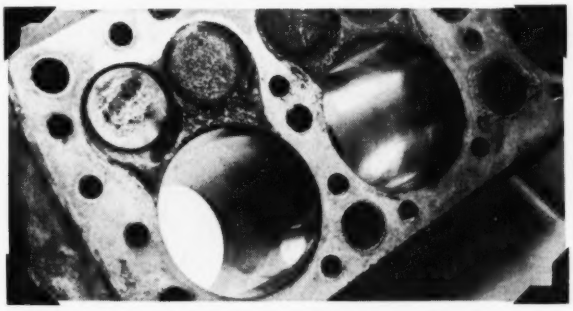
UNIT V-8 gasoline engine

CONDITIONS Heavy load, constant operation

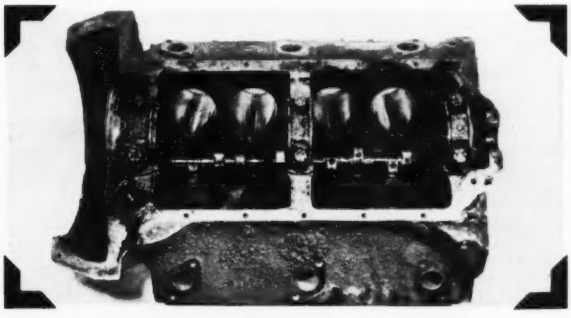
PERIOD 15 months

FIRM Timber Products Co., Medford, Oregon

Heavy duty motor oil cuts engine wear 73%!



LUBRICATED WITH HEAVY DUTY RPM MOTOR OIL, this engine showed only 0.00845 inch cylinder wear after 131,625 miles of tough work. Three similar engines used in the same vehicle, but lubricated with another oil, showed from 0.016 to 0.020 inch cylinder wear after only 75,000 miles! Heavy Duty "RPM" cut engine wear 73%! In this engine, rings were free, oil holes were open and there were no deposits in ring grooves as shown in this unretouched photo of a representative piston.



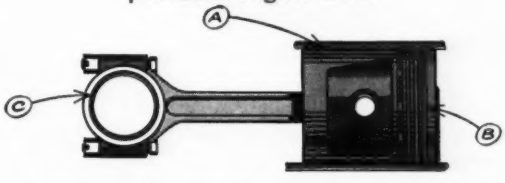
THE ENTIRE ENGINE WAS EXCEPTIONALLY CLEAN for such long service. Note particularly the lack of sludge around the camshaft. The valve springs were all visible with only minor deposits around them. Heads were clean. Con-rod bearings and main bearings showed no pitting and were worn only 0.002 inch.

REMARKS: Heavy Duty RPM Motor Oil was developed through atomic research to prevent extra wear. It keeps engines clean of carbon and lacquer, resists the formation of deposits, prevents corrosion, and stops foaming in the oil systems. Comes in several grades.

HEAVY DUTY RPM MOTOR OIL

TRADEMARK "RPM" REG. U.S. PAT. OFF.

How Heavy Duty RPM Motor Oil prevents engine wear



A. Contains special compounds that keep lubricant on metal whether hot or cold —reduce starting and running wear and rusting when idle.

B. Detergent makes carbon and soot contaminants harmless—keeps rings free, engine clean.

C. Resists oxidation and corrosion, stops foaming.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

When Life's at Stake Rely on...

KLEIN

Show the familiar Klein trademark to the old-timer on the pole and he'll tell you—"that's the equipment I've been using ever since I was a grunt."

Yes, workmen just naturally feel safer when the equipment is Klein—recognized for quality "Since 1857."

ASK YOUR SUPPLIER
Foreign Distributor: International Standard Electric Corp., New York.

Write for your free copy of the Klein Pocket Tool Guide today!

Since 1857

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVE., CHICAGO 18, ILL.

Wireways

(26) Keystone Mfg. Co., 23328 Sherwood Ave., Center Line, Mich.

Designed for use with meter boards, service boards, loadside switches, etc., these flangeless screwcover wireways are 2½ in. square and come in 1- to 5-ft lengths. Knockouts for ½- and ¾-in. conduit are provided at no extra cost when desired, the manufacturer states. Wireways are made of heavy-gage steel, finished in standard grey baked enamel. Other finishes are available upon request. Auxiliary fittings include closing plates and U connectors.

Mogul Starter Socket

(27) Sylvania Electric Products Inc., 1740 Broadway, New York, N. Y.

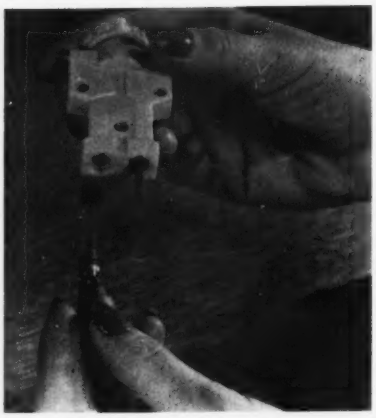
A new mogul separate starter socket, S-377, is designed for use with glow-switch-type starters and will accommodate two-pin (FS-6 and COP-6) and four-pin (FS-64 and COP-64) designs used for starting 85-, 90- and 100-w lamps. Featuring two lead wires, the S-377 is recommended by the manufacturer over the four-lead S-375 because it simplifies wiring and reduces costs. The manufacturer recommends the S-375 only for use with thermal starters.

(28) CONTROL—Firetron scanner type 48PT1 provides flame failure protection for gas, oil, pulverized coal or combination fuel burner installations. It is said to guarantee instantaneous burner shutdown in event of flame failure; is used in conjunction with control type 26SJ5 for protection of manually ignited burners and with programming control type 26RJ8 for protection of automatically fired installations. The manufacturer, Combustion Control Corp., 720 Beacon St., Boston 16, Mass., gives details in bulletin CP511.

(29) ALARM—A plug-in annunciator system incorporating interchangeability of circuits and functions has been announced by Panalarm Products Inc., 6312 N. Broadway, Chicago 40, Ill. According to the manufacturer, a single, standard unit may be used to signal any off-normal condition throughout a plant. Audible and visual alert signals are provided. Details of Panalarm 50 are contained in catalog 100.

(30) WARNING SIGNAL—Three new models of its Gyralites, specifically designed for general industrial use, are being offered by Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill. These lights are said to project a high-intensity colored or clear beam that rotates with a wide sweeping action. Details in bulletin 5015.

(31) REAMER—A spiral 2-S pipe reamer made by Ridge Tool Co., Elyria, Ohio, is claimed to cut inside burr from pipe and conduit quickly and with little effort or pressure. Capacity is ⅛ to 2 in.



Plug with Replaceable Fuses

(32) Noma Electric Corp., 55 W. 13th St., New York 11, N. Y.

This electric plug contains two replaceable fuses that blow when the wire is shorted or overloaded, leaving the rest of the circuit undisturbed. An electric appliance can be wired to the plug by inserting rubberized double-strand wire and turning a locking spring. One 250-v glass cartridge fuse is attached to each prong and is removed by pressing the prong slightly into the plug and twisting. The plugs are encased in American Cyanamid Beetle plastic and come in ivory or brown.

Steel Framing System

(33) Flexa Steel Products Inc., 1348 W. Washington Blvd., Chicago 7, Ill.

An all-bolted steel framing system consists of a series of specially designed components for construction of all kinds of frames, hangers and racks. There is also a series of cold-rolled steel channels, case hardened serrated nuts and a number of fittings for various applications, including hanging fluorescent lighting fixtures and other electrical equipment. Use of 12-gage channels allows F fixture hanger rods to be placed on centers up to 15 ft, the manufacturer states. These channels can be used also as a raceway on interval spaced jobs.

(34) SAFETY HAT—A fiber glass safety hat is offered by the United States Safety Service Co., 1215 McGee St., Kansas City, Mo. It is said to meet the ASA code for dielectric breakdown and to exceed the ASA code for impact resistance. The cradle of the hat can be adjusted to fit all head sizes.

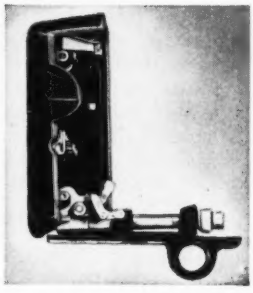
For More Data Fill in Coupon on Page 78

1878 75 1953
YEARS OF ELECTRICAL PROGRESS

Four cutouts in one

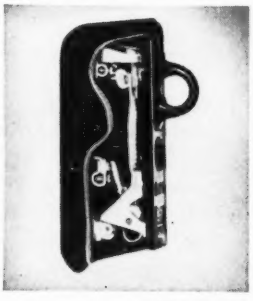
by simply changing doors

Indicating



Drop-out

Reclosing



Disconnect

A G-E FEATURE SINCE 1937! By stocking only three interchangeable doors which fit both 5.2- and 7.8-kv, 50-ampere housings, you get the 4 operating functions illustrated at the left. Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By saving a service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

WHAT'S MORE THE CUTOUT IS LIBERALLY DESIGNED —has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated. All live parts are completely enclosed for maximum safety.

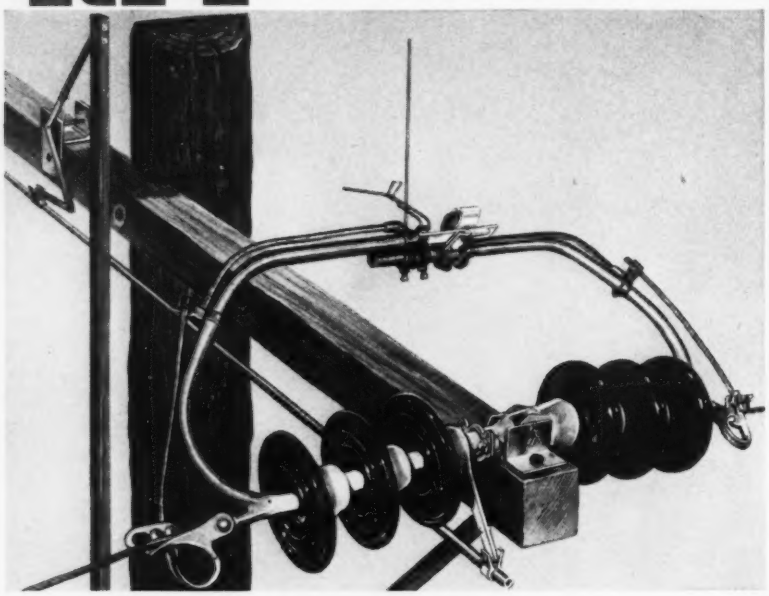
For complete information contact your G-E Apparatus sales representative, or write for Bulletin GEA-3448. General Electric Company, Schenectady 5, N. Y.

406-44

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

KPF POLE TOP SWITCHES



Simple design means more switch ...for less money!

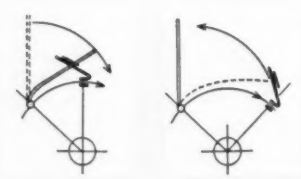
KPF Pole Top Switches cost less because they are simplest in design. They lower installation costs because they bolt on a single crossarm in minutes, require no extra insulators. KPF switches save, too, on upkeep; simple push-pull interphase rods never bind because of crossarm warpage; monel and bronze bearings never need lubrication.

KPF switches may be used in horizontal, vertical or triangular mounting. Free floating, self aligning blades and jaws maintain proper contact under all conditions of switch sag adjustment.

NEW QUICK-BREAK ATTACHMENT FOR KPF SWITCHES

The split-second breaking speed of these new KPF attachments means you can switch many circuits without using expensive circuit breakers. Attachment is available for all KPF switches rated 15 to 69 kv.

WRITE FOR DETAILS

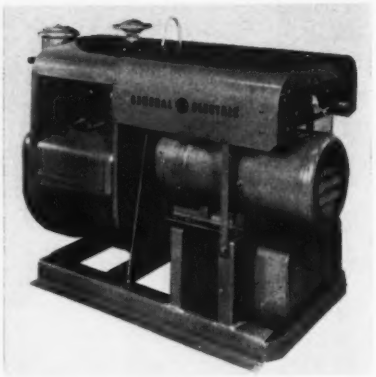


Spring rod winds to full tension as switch opens.

Rod springs clear, breaking contact at high speed.

KPF ELECTRIC COMPANY

1624 E. Alpine Avenue • Stockton 5, Calif.



D-C Arc Welder

(35) General Electric Co., Schenectady 5, N. Y.

A 200-amp, engine-driven d-c arc welder with a 60% duty cycle has a current range of 40 to 250 amp and can be used with a variety of electrode sizes for repair, maintenance and construction. This WD-42AGW model consists basically of a G-E type WD42 generator and a Wisconsin air-cooled engine; is designed to fit crosswise in a standard pick-up truck. Optional equipment includes a trailer, with fittings for pressure lubrication.

Forced ventilation keeps internal temperature within safety limits when the welder is operated on a 60% duty cycle at rated load, the manufacturer states. Tests indicate that heavy overloads for short periods do not produce harmful results.

(36) TOOL—A tool that will cut grooves in plastered walls and ceilings for electric conduit is offered by Wodack Electric Tool Corp., 4627 W. Huron St., Chicago 44, Ill. This portable electric plaster cutter weighs 13 lb; operates two 4-in. abrasive cutting wheels at a speed of 1,400 rpm. Wheels can be set to cut grooves of different widths up to 1¼ in. Depth of cut can be adjusted to plaster thickness.

(37) SCALE—A 5x5-in. transparent plastic template said to perform the basic functions of slide rule and scale with no moving parts is offered by New-Era Products, 6 Peter Cooper Road, New York 10, N. Y. It can be used on any fractional inch scale drawing, measures circles, cylinders, rectangles and cubes, according to the manufacturer.

(38) INSTRUMENT—The Amprobe 300, a pocket-size volt-ammeter with nine ranges up to 300 amp and 600 v has been introduced by Pyramid Instrument Corp., Lynbrook, N. Y. It is of the snap-around type, which permits user to measure current without shutting down equipment or making ammeter connections.

(39) MAINTENANCE TOOL — A portable electronic maintenance instrument for locating trouble in moving mechanisms is offered by Anco Instrument Division, 4254 W. Arlington St., Chicago 24, Ill.

Prominent Distributor tells why he prefers to sell fluorescent fixtures using CERTIFIED BALLASTS

ARTHUR N. ANIXTER, *of Englewood Electrical Supply Company*

"We prefer to sell fluorescent fixtures that use Certified Ballasts because they reduce ballast trouble and keep our customers satisfied," says Arthur N. Anixter of Englewood Electrical Supply Company, an outstanding Midwestern fixture distributor.

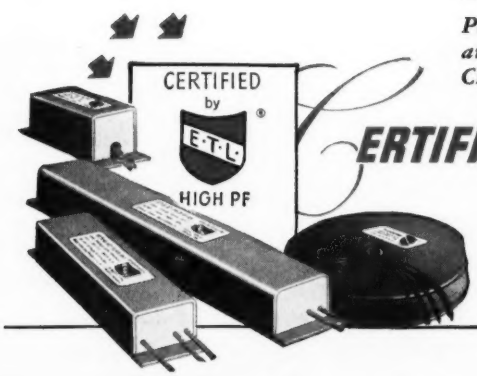
Architects, engineers, fixture manufacturers, contractors and distributors alike know that CERTIFIED BALLASTS assure—

Full Lamp Life **Rated Light Output** **Long Ballast Life**

CERTIFIED BALLASTS are made by 10 leading manufacturers to precise specifications, then tested by Electrical Testing Laboratories, Inc., which certifies they conform to these high standards.

Write for complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer.

Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

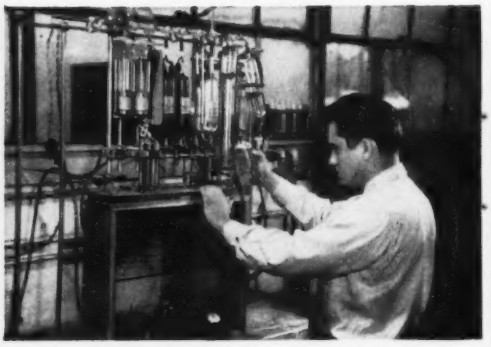
MOLONEY *HiperCore*

MATERIAL CONTROL

1.
MATERIAL CONTROL

All materials used in the manufacture of HiperCore Distribution Transformers are tested before fabrication to be sure that Moloney specifications have been met.

Tests of sample from each roll of oriented silicon core steel are made for flux carrying capacity, exciting current losses, weight, thickness and uniformity of laminations.

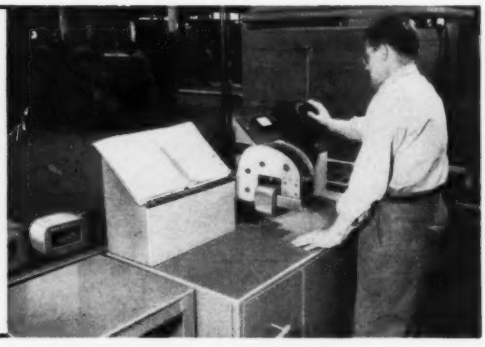


A transformer is no better than its oil. Complete ASA tests are made on samples of every tank car of oil received at the Moloney plant. In addition a series of special tests has been devised by Moloney to guarantee uniform quality of each shipment of oil. These tests are all in addition to tests made at the refinery.

PROCESS CONTROL

2.
PROCESS CONTROL

Each core and each coil is tested separately after being wound and again tested during various stages of assembly to be sure that each is of the high quality required in HiperCore Transformers.

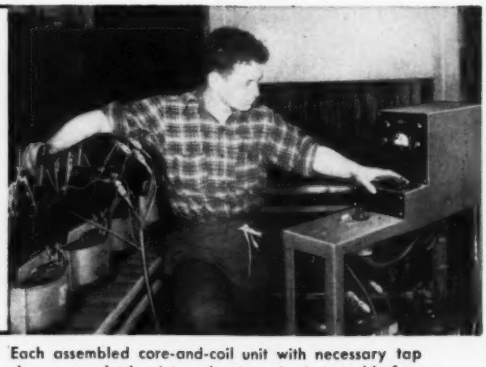


Each HiperCore core is tested after annealing and impregnation for hysteresis and eddy current losses before and after cutting.

Each HiperCore coil is tested for proper ratio of turns between windings in all tap positions.

3.
PRODUCT CONTROL

Every HiperCore Transformer receives complete ASA tests before leaving our factory. Periodic surge tests of transformers taken at random from the production line are also made on our 3,600,000 volt surge generator.



Each assembled core-and-coil unit with necessary tap changers and other internal accessories is tested before being tanked.

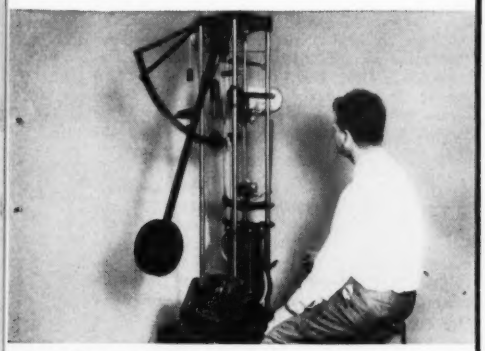
Final HiperCore tests and final ASA Standards Tests are made on all transformers. Included are loss tests, exciting current tests, polarity check, ratio check and dielectric tests.

M O L O N E Y E L E C T R I C

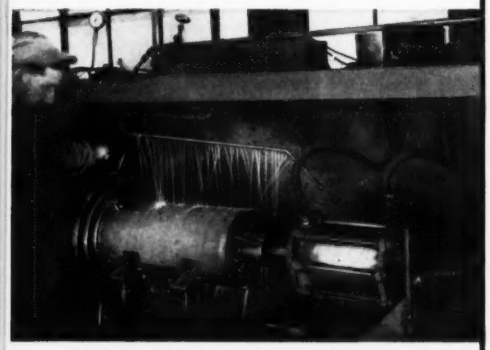
Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control

FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

DISTRIBUTION TRANSFORMERS



Comparative tensile strength tests are made on samples of new material and on samples which have been aged in oil to determine the ability of the product to withstand the deteriorating effects of the oil.



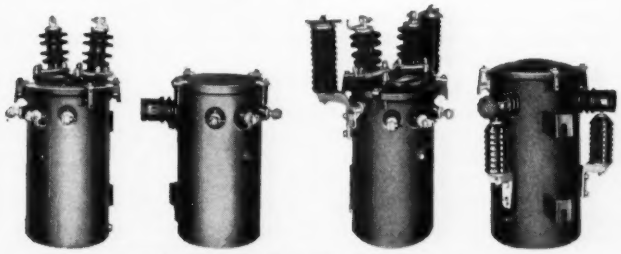
Each HiperCore transformer tank is individually pressure-tested in this special spray machine, before painting.

Periodic surge tests are made on samples from the production line. Film strip of cathode ray oscillograph reveals capacity of transformer to withstand surges in excess of those normally encountered in service.

Step by Step... tested to be BETTER!

From the first step in the manufacture of Moloney HiperCore Distribution Transformers a *better* transformer is in the making. ASA tests prescribed by the industry are made to be sure that our product conforms to industry standards, but many additional tests are also made in all stages of manufacture and assembly to insure *better* all-around performance in the finished product.

This *Better Performance* starts with quality control of the raw materials and does not end until the transformer is completed. The fine reputation of Moloney Transformers, which is taken for granted by many utilities, has been achieved because of these rigid controls.



Moloney HiperCore Distribution Transformers are available in all standard ratings from 3 Kva up in both Conventional and CSP designs.

ME53-1

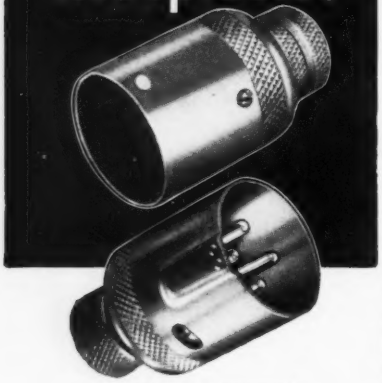
C O M P A N Y

Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES

MOLONEY ELECTRIC = BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE

TRIPLOC Plugs and Receptacles



1, 2, 3, 4, 6, 8 pole interchangeable and reversible contact units.

An Exceptionally Versatile Line in the Heavy Duty Field

An exceptionally versatile line, unequalled in the heavy duty field, with a virtually unlimited number of assembly combinations to meet the individual requirements of *any* portable electrical equipment.

Interchangeable contacts, 1 to 8 poles, can be assembled in standard plug shells and receptacle housings. The protected female contact unit can be assembled in either plug or receptacle for safety in the line side of the circuit. Fusible types and units with one pole grounded are also available.

Automatic bayonet lock with either manual or combination manual and automatic release protects equipment and wiring. Wide range of pressed steel plug shells, receptacles, and cord connectors available in the complete Triploc line, including cast metal housings threaded for watertight gasket seal. Ratings up to 20 amperes, 250 volts DC, 460 AC. Consult your Pylet Catalog 1100, Bul. 1140-1, for complete listings.

CONDUIT FITTINGS • FLOODLIGHTS

SINCE 1897

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Avenue, Chicago 51, Illinois

BULLETINS ETC.

(40) TIMING RELAYS—Allen Bradley Co., Milwaukee, Wis., is offering a 16-page bulletin featuring its complete line of timing relays. Fluid dashpot, pneumatic and electronic timers are described and operation and engineering data are given. Timers are shown in a variety of standard enclosures. A selector chart is provided, with suggestions on various factors to consider in choosing a timing relay for a particular application.

(41) RESINS—The technique of embedding electrical components in Scotchcast brand electrical insulating resins is described in an eight-page booklet issued by Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn. Applications for both Scotchcast No. 1 (hot pouring) and No. 2 (cold pouring) resins are given, use of fillers to obtain special characteristics is discussed, casting techniques are outlined briefly. Properties of these resins are presented on a technical data page.

(42) METERING APPLICATIONS — A 20-page booklet contains circuit wiring diagrams for the various metering applications for watt-hour meters. It also describes watt-hour meter constants and register data, the determination of watts load and use of watt-hour meters with instrument transformers. Designated GET-1905, this booklet is available from General Electric Co., Schenectady 5, N. Y.

(43) BOXES—More than 500 cast iron junction boxes are cataloged in a 12-page bulletin from O. Z. Electrical Mfg. Co. Inc., 262 Bond St., Brooklyn 2, N. Y.

(44) STADIUM LIGHTING—Bulletin 605 from Pyle-National Co., 1334 N. Kostner Ave., Chicago 51, Ill., describes floodlighting of a typical athletic arena.

(45) INFORMATION KIT — Permanent magnet application ideas for industry are contained in a kit to be issued once a month by the Carboloy Department of General Electric Co., Detroit 32, Mich. The basic kit consists of a heavy permanent binder with six application ideas described on loose-leaf pages. Monthly sheets will be sent to those who request the basic kit.

(46) INSULATORS—Manufacture of wet process porcelain insulators is treated in a 36-page booklet published by Victor Insulators Inc., Victor, N. Y. Various steps from receipt of raw materials to final testing and shipment are described and illustrated. Reasons for its development of purified porcelain are covered by the manufacturer.

(47) CONTROL CENTERS—An application booklet stresses the case for centralizing all controls of an entire system in one group of enclosures and discusses characteristics that make for flexibility of application, ease of servicing and safety. Three types are described in this booklet, which is offered by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(48) INFORMATION BOOKLET—"Questions and Answers about the RLM Label" is the title of an eight-page, pocket-size booklet offered by RLM Standards Institute, Suite 818, 326 W. Madison St., Chicago 6, Ill. The booklet answers queries about the institute, its label and the certification procedure.

(49) LIGHTING—Day-Brite Lighting Inc., St. Louis 7, Mo., has issued catalog sheets on its Luvex-4 slimline; all-white parabolic troffers; one-row 85-w fluorescent strip; one-row 75-w slimline strip. two-row 75-w slimline strip; recessed nite lights.

(50) FUSES—Southern States Equipment Corp., Hampton, Ga., has published bulletin 528 covering its line of outdoor dropout expulsion power fuses.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after April 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50										

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*Please include your company's name and your position, since we cannot ask manufacturers to furnish literature unless you do.

SAVE WITH ALUMINUM CONDUCTOR

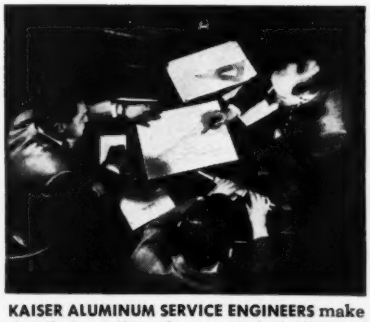
INITIAL SAVINGS—You *automatically* effect major savings when you specify aluminum conductor, because aluminum costs less than copper. Handling is easier because aluminum with equal conductivity is only about half the weight of copper.

INSTALLATION SAVINGS—Light weight aluminum conductor is easier to carry, easier to string, easier to move around. This results in faster, lower cost installations. Your *total average savings* with aluminum conductor can be as much as 25%.

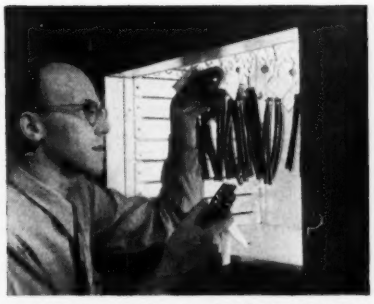
SAVE MORE

WITH KAISER ALUMINUM CONDUCTOR

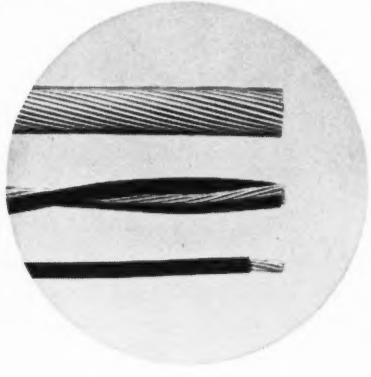
KAISER ALUMINUM FIELD ENGINEERS work right on the job alongside crews, give stringing assistance, suggest ways to cut costs all down the line. They keep tabs on customer schedules—help maintain Kaiser Aluminum's unsurpassed record for *on-time delivery*.



KAISER ALUMINUM SERVICE ENGINEERS make detailed studies of customer's *individual problems* with an eye to greater economies. They help coordinate specifications and designs. They conduct meetings with crews, provide sag and tension charts on request.



KAISER ALUMINUM LABORATORY SERVICE assists customers on problems requiring fundamental research—often resulting in worthwhile savings. It's one of the industry's best-equipped and staffed laboratories, backed by Kaiser Aluminum's fully-integrated facilities.



THIS COMPLETE SERVICE is available to you at no obligation when you specify Kaiser Aluminum conductor. *Act now!* A letter or telephone call is all that's required. Also request free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable for service drops and secondary distribution lines. Contact any Kaiser Aluminum office in principal cities, or one of our many conductor distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service

NEOPRENE AND POLYETHYLENE COVERED CONDUCTOR, SOLID AND STRANDED • SELF-SUPPORTING TRIPLEX CABLE • ACSR • ALL ALUMINUM CONDUCTOR

80 years ~~old~~ young

Age in itself means very little. But age accompanied by historic achievements and age that is continuing to produce the finest products of their type is something of which we are proud.

1873

Founded in 1873, The R. Thomas and Sons Company very early became closely allied to the electrical industry.

1885

In 1885, the first "Thomas Quality" insulator was produced, the first shipment going to the U.S. Electric Lighting Co., Chicago.

1893

In 1893, all of the porcelains used in the lighting arrangement for the World's Fair at Chicago, installed by Westinghouse, were Thomas.

1896

In 1896, Thomas perfected the first multi-part, high-voltage, pin-type insulator. It was known as the "Boch" Glaze-Filled Insulator, later to be patented under No. 600,475. It represented the initial step toward making possible the transmission of electrical energy at higher voltages.

1907

In 1907, Thomas designed and made the first cap-and-pin suspension insulator. Units installed that year are still giving trouble-proof service after 46 years of continuous operation.

1917

In 1917, we introduced the Thomas link-type Hewlett suspension insulators. Insulator failure being virtually unknown with this design, it is easy to understand why hundreds of thousands are still giving satisfactory service today.

1938

In 1938, Thomas engineers pioneered and were first to develop the under-glaze metallic oxide coating that guarantees the "noise-free" operation of the patented Thomas "Q-T" Insulators. (Patent No. 2154387)

These are among the many Thomas "Firsts" and contributions which have helped the Electrical Industry reach its present position.

TODAY, in our 80th year, we are ready with improved facilities and increased capacity to meet the most exacting needs of the Industry. After all is said, it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Why gamble?

The R. Thomas and Sons Co.

1873 THOMAS INSULATORS our 80th year RELIABILITY 1953

LISBON, OHIO
NEW YORK CHICAGO

Sales Representatives: C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* • Ken H. Best, *Seattle* • R. E. Cunningham & Son, *Los Angeles* • W. H. Eddy Electric Products, Inc., *Phoenix* • Engineer Sales Corp., *St. Petersburg* • Hamilton Associates, *Denver* Geo. E. Honn Co., *San Francisco* • Hugo Sales Co., *Minneapolis* • W. A. Leiser & Co., *Philadelphia* • John G. Pettijohn Co., *Knoxville* H. E. Ransford Co., *Pittsburgh* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan Co., *Boston* • Tafel Electric & Supply Co., *Louisville* Walter E. Thompson Co., *Birmingham* • Triangle Electric Supply Co., *El Paso* • United Electric Supply Co., *Salt Lake City* • Williamson Sales Co., *Shreveport, Amarillo, Corpus Christi, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities*

1953
Thomas QUALITY
INSULATORS AND
ACCESSORY HARDWARE

ELECTRA'S HUSBAND

"HOW much more electricity do we use today than we did ten years ago?" I asked Electra one evening recently when she was knitting while I read.

"I really don't know," she said. "Maybe half again as much or even twice as much. You should be able to figure it out. We have a refrigerator that is three times as big as the old one. I have a new two-oven range. The freezer is new. So are the two electric blankets. We have three radios where before we only had one. The living room is light-conditioned. There must be a lot of other things. Why do you ask?"

"This article I'm reading says that Americans increased their use of electricity more between 1940 and 1950 than in all of the previous time since electricity was developed in this country. I wonder if we were typical. From what you say we are.

"The author cites that fact as one of the phenomena of what he calls 'The American Explosion.' He claims that we Americans are living in an extraordinary period of history that came into fruition during the 1940-50 decade."

"Oh, I thought the American explosion took place last November," she mused. "At least that's what you and a lot of your friends seem to think."

"Fenton Turck, the author of this piece, would go along with that because he's a Republican too," I continued. "However, that isn't what he means. He points out that we present-day Americans are reaping the heritage of three hundred years of pioneering in a free democracy where adventurous curiosity and inventive ingenuity were fostered and rewarded. He compares our privilege with that of the Greeks who lived during the Golden Age of Pericles."

"I'll take today," Electra interrupted. "Look what happened to the Greeks in two thousand years."

"You certainly can contradict yourself on occasions," I said. "Most of the time you admire antiquity."

"Oh, I like my old things all right," she continued. "That's why I still like you."

"It's a combination of new and old things that have created the American Explosion according to Mr. Turck," I continued. "He points out that Americans, as a people, have more today in tangibles and intangibles than any other people on earth. Let me read you some of the advantages and opportunities we share, in addition to twice as much of electricity as we ever had before:

" 'Americans spent more dollars to go to classical musical concerts than to baseball games last year, and 96% more constant dollars for books than they did a decade before.

SOME DIVIDENDS OF FREEDOM

" 'The average American's real purchasing power was 53% greater in 1950 than it was in 1940; after adjustment for the rise in living costs, the average workman's real wages were 35% higher last year than in 1938.

" 'In the decade 1940-50, 141,000,000 Americans have moved from one part of the country to another, from farms to industrial centers, from one house to another.

" 'The average family diet improved sufficiently to help produce children 2-3 in. taller than children of the same age 50 years ago. This food cost the breadwinner less than half the percentage of his income he spent in 1900.

" 'Forty-five per cent more Americans graduated from colleges in 1948 than in 1940.

" 'In America today, for the first time in history, more consumers own their own homes (54%) than pay rent.

" 'In a steel plant it takes five hours to anneal a ton of strip steel—instead of 120; in a textile plant an electronic device checks color in 2½ minutes—instead of 1½ hours.

" 'In the 1940-50 decade the output of petroleum increased more than it had since the discovery of oil.

" 'In 1947, 38% more factories employing 52% more workers turned out a dollar volume of goods three times as high as 1939.

" 'More bibles were purchased between 1941 and 1951 than were bought in the previous 40 years.' "

"Just like an engineer you overcome me with statistics," she commented. "But what you read makes sense. We as a people have more to be thankful for than any other nation in the history of the world. It's just too bad that war and the threat of war, politics and a lot of other things tend to keep our minds filled with doubts and distractions."

"People throughout the world look at us as a greedy, money-loving extravagant people," I continued. "And they have reason, what with the actions of some of our representatives and the impressions they get from American movies. But the fact is that we are not just rich in dollars and possessions alone. There has been a cultural revolution too in this great American Explosion. Mr. Turck cites some additional facts to prove that.

"For instance he says that personal expenditures for books, for the legitimate theater and opera and for classical phonograph records range from 80% to 96% more than they did ten years ago. There are more symphony orchestras, more opera companies and more communities that give their people serious musical programs than ever before. But that isn't all. In 1948 folks in America spent three times as much for home decoration as they did in 1939. They bought twice as much furniture last year as they did a decade ago. Women dress better and so do men. More folks travel, not just at home, but all over the world. Our health is better and our life span extended. Yes, there has been an American Explosion.

"The companies that fail to recognize that fact are in for a rough time of it in the future.

"Why, come to think of it, our American Explosion has been like atomic fission. Starting with the freedom to *think* acting upon the freedom to *do*, a chain reaction has exploded into *ideas* in all directions that have given us more new achievements in culture, the arts, science, mechanics, materials — as well as unlimited inquiry into religion and philosophy. We are *free*."

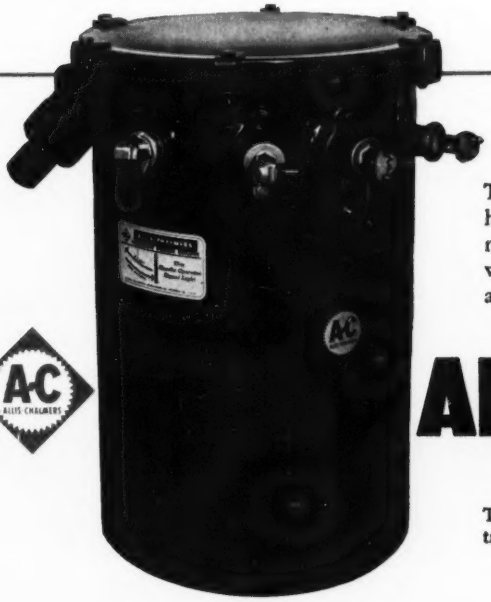
Thermalite
OVERLOAD INDICATOR

. . . gives you today's biggest value in overload protection

Spots overloads quickly . . . But it won't interrupt service

Here's real ease in overload detection. Check the brilliant light of the *Thermalite* overload indicator right from your service truck. It's visible from hundreds of feet away to keep you posted on load conditions in hard-to-get-at locations.

The *Thermalite* overload indicator shows you when your transformer is overloaded, but it won't interrupt service. That means you can schedule transformer replacements or load rearrangements during daylight hours . . . and do away with costly emergency measures.



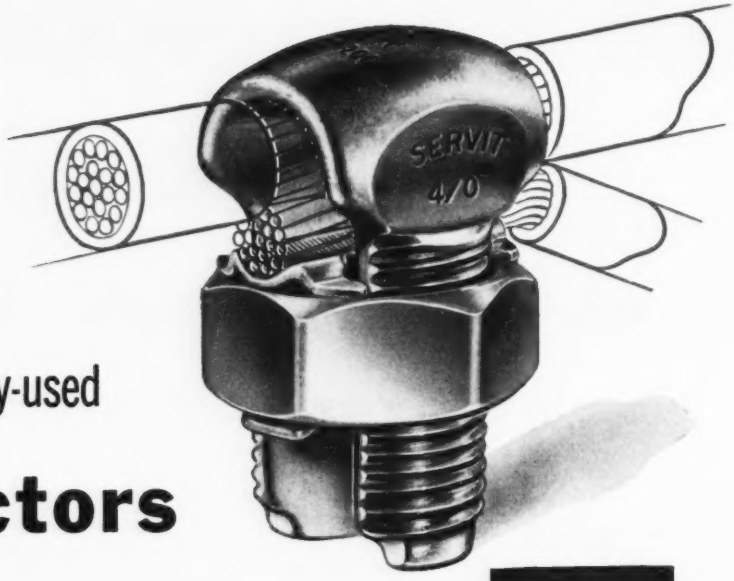
The *Thermalite* overload indicator will save you hundreds of hours of expensive surveys. It eliminates the need for keeping countless records, too. It will pay for itself quickly in transformer utilization and longer transformer life expectancy. A-3843

Thermalite is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

The *Thermalite* indicator is available on distribution transformers 100 kva and smaller, 15 kv and below.



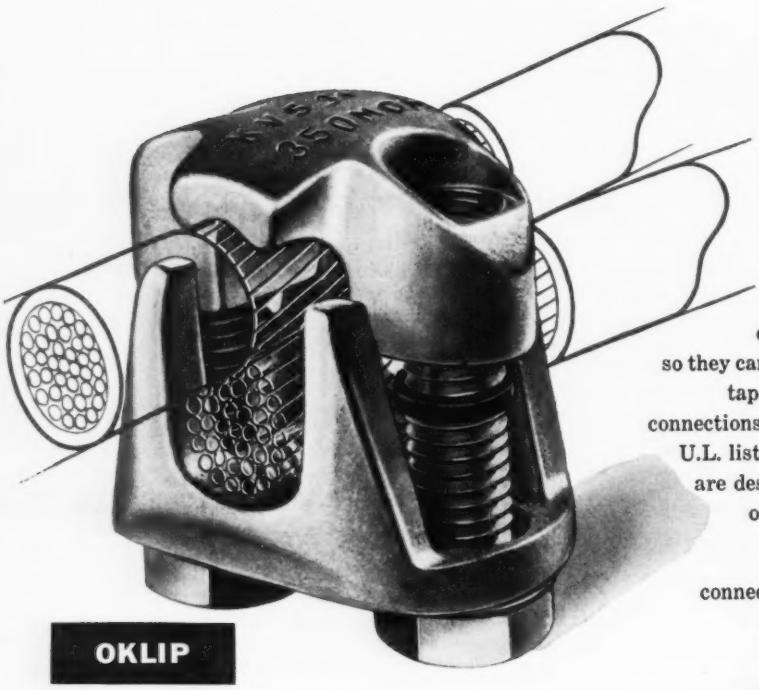
Why are these

the most widely-used

connectors

in America?

SERVIT



OKLIP

Because Burndy Servits and Oklips are *engineered* of high-strength alloys – to provide the high mechanical strength that assures sound electrical connections. Because they're compact – easy to install, easy to tape. Because they withstand overload, vibration stresses, corrosion conditions, and high tightening torque – so they can be used *over and over again* for splices, taps, deadends, light or heavy-duty service connections – indoors or outdoors. Because they're U.L. listed. Because Servit and Oklip variations are designed to accommodate any combination of copper, aluminum or steel conductors.

For long years of trouble-free service connections, it pays to *specify* Burndy Servits and Oklips. *And be sure you get them!*

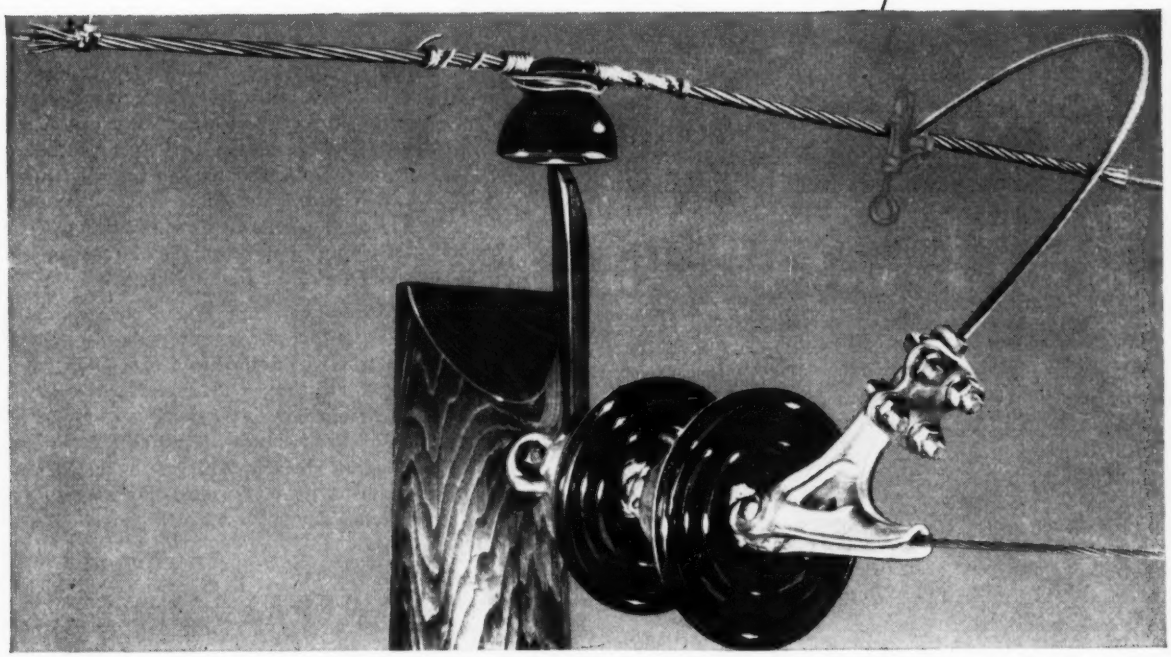
ALWAYS . . . consult Burndy Catalog 50 – your basic source of all connector information.

BURNDY

53-2 **BURNDY ENGINEERING COMPANY INC.,** NORWALK, CONNECT. **BURNDY CANADA LTD.,** TORONTO 8, ONT.

ACSR

and Alcoa Accessories



When you buy aluminum conductors from Alcoa, you can fill all your requirements in a single transaction—and be sure you're getting the right accessories. For Alcoa originated both aluminum conductors and accessories . . . continues to develop and improve them.

Designed for best service, there's an Alcoa accessory for every need. Alcoa backs them up with experienced design, laboratory and manufacturing facilities.

Call your Alcoa sales office for aluminum conductors *and* for accessories that are right —on the line.

ALUMINUM COMPANY OF AMERICA
2103-B Alcoa Building • Pittsburgh 19, Pa.

"SEE IT NOW" with Edward R. Murrow—CBS-TV every Sunday . . . brings the world to your armchair. Consult your newspaper for local time and channel.

Alcoa Aluminum

ALCOA ALUMINUM ®

ALUMINUM COMPANY OF AMERICA

Top Talent, Top Shows, sell

ELECTRICITY FOR BETTER LIVING

Constantly whetting the wants of Americans for the better life electricity can bring, the General Electric television and radio shows have been hailed as doing an outstanding promotion and public relations job for the entire electrical industry.

Top-ranking stars, presented in two television shows and one radio program, beamed weekly over nation-wide networks, are welcome visitors in millions of homes. Gay, wholesome entertainment sets the stage for telling the story of electrical equipment and progress under the most favorable conditions. In an atmosphere of friendly intimacy and goodwill, audiences are given a new and broader understanding of the part electricity is playing in our national welfare and a new appreciation of the benefits that come from living the electrical way.

The value of these programs can never be measured in dollars and cents. Perhaps the best indication of their worth may be gathered from the high regard in which they are held throughout the electrical industry. General Electric aims to make them even better in 1953. General Electric Company, Schenectady 5, New York. 301-227

MORE POWER TO AMERICA

GENERAL ELECTRIC

FRED WARING

Lavish settings, brilliant direction and talented handling of gay song and dance numbers have caused the Sunday night Fred Waring Show to be named again and again as the best family entertainment of its kind on television. The high caliber of the program reflects the prestige of the electrical industry and insures a receptive audience for the skilfully introduced commercials. At left, Fred Waring is shown with some of the thousands of appreciative letters received from a delighted nation-wide audience.

BING CROSBY Songs and patter by the inimitable Bing, Thursday nights, CBS radio network, help sell electrical appliances.

JOAN DAVIS Star of "I Married Joan," latest G-E television show, Joan Davis gets into merry mix-ups Wednesday nights on the NBC-TV network. Above, she tastes something gag writers have cooked up. Show promotes electrical appliances.

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

ELECTRICAL WEST
SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

ANOTHER YEAR OF EXPANSION AHEAD

Continued migration of industry, more industrial output than ever before, record volume of consumer spending, construction expenditures that rival the all-time highs of 1950, population growth at a rate five times the national average—these are but a few of the gages of the dynamic character of the Far Western economy. Coupled with the promise of a better political and economic climate generated in Washington these factors account for the records that the Far Western electrical industry is piling up in new loads, customer growth, facility expansion and construction expenditures. 1952 saw new peaks in all of these industry measuring sticks and 1953 promises even greater accomplishments.

Here is a capsule measurement of Western electrical development: In the 11 Far Western states 12.5% of the U. S. population uses 20% of all the U. S. electrical energy generated, developed by 18.4% of the nation's power generating facilities. To keep pace the Far West's utilities are expanding at a record rate—2,000,000 kw per year and are spending $765,000,000 or 21% of the total utility capital funds (including federal agencies) in this expansion program.

Continuation of the Westward migration of people and industry is predicted by all of the experts through 1960 (California's Governor Warren says 1975). Hence electrical industry growth and development must be maintained at present levels through the present decade at least.

To keep pace with the growing demand for service Far Western utilities —private and municipal—spent $488,151,000 on new facilities during 1952. For 1953 the budgets call for expenditures totaling $491,407,000. Federal agencies added $240,886,000 to the 1952 totals and have budgeted $274,039,000 for this year.

Individual programs point up the spectacular nature of Western electrical development. During 1953 the Pacific Gas and Electric postwar expansion will pass $1 billion. President J. B. Black recently reported that it is scheduled through 1954 at an average rate of $13,000,000 per month. Here are some typical figures:

	Spent 1952	Budgeted for 1953
Idaho Power Co.	$ 9,000,000	$ 12,858,000
Public Service of Arizona	6,572,400	16,972,000
San Diego G&E	12,381,000	13,350,000
Pacific Gas and Electric	140,000,000	140,000,000
Montana Power	3,800,000	7,350,000
So. Calif. Edison	70,000,000	73,000,000
Public Service of Colorado	10,000,000	15,100,000

No region of the U. S. excels the Far West in dynamic growth potentials. Such facts and figures as these confirm this contention:

• • • Population in southern California increased 60% between 1940 and 1952. Wartime industrial expansion (1940-45) in that area totaled $477,000,000. In the immediate postwar period this expansion continued; 1946-50 expenditures for new and expanded industry added up to $544,000,000. Then the lid blew off. 1951 totaled $308,000,000; for 11 months of 1952 the figure was $316,000,000. Construction permits for southern California were $202,000,000 for 1940. In 1951 the total jumped to $1 billion plus. For 11 months of 1952 it was $856,000,000.

• • • Population and industry in northern California show a similar trend. Annual population increase averages 3.5%—the region now represents more than 4% of the national market. Industrial expansion in 1952 totaled $205,000,000. A conservative estimate for 1953 is $190,000,000; 55,000 new single family dwellings will be built in 1953 equaling the 1952 figure. Commercial and industrial power sales are expanding at an average annual rate of 5.4%.

• • • For the 11 Western states as a unit 1953 construction—all classes —is expected to exceed $4 billion, a 10% increase over 1952.

• • • Another gage of Western growth is the construction budget of Pacific Telephone and Telegraph Co. Total for 1953 is $235,000,000, an increase of $35,000,000 over 1952.

• • • Experts hold that the Pacific Northwest is on the threshold of a great period of growth and expansion. Having suffered from an electric power deficit for several years past, the area is beginning to see daylight ahead. It will soon have a new resource—ample fuel in the form of oil and natural gas from the Western Canadian fields. Expenditures for new power facilities for this region alone will total $275,000,000 per year for at least a decade.

• • • Industrial decentralization is bringing new factories and new people to the Rocky Mountain region at a rate rivaling the wartime industrial expansion of the Pacific Coast. Coupled with this is an accelerated program of natural resource development especially in the metallic and nonmetallic industries. Butte Hill in Montana and San Manuel in Arizona are typical.

Details are given in the pages that follow.

Table I—Comparison of National to Western Operations for 1951 and 1952

	11 Western States		United States		Per cent West to U. S.	
	1951	1952	1951	1952	1951	1952
Energy generated (thousands of kwh)	72,889,478	78,067,521	370,234,364	399,374,000	19.7	19.6
Energy generated in hydro plants (thousands of kwh)	53,774,860	60,929,335	99,767,214	106,280,000	53.9	57.2
Energy generated in fuel plants (thousands of kwh)	19,114,618	17,138,186	270,467,150	293,094,000	7.1	6.3
Percentage of hydro to total generated	73.7	78.0	26.9	26.7	...	...
Installed generator capacity (kw)	13,925,677	14,691,000	75,544,276	79,778,000	18.4	18.4
Installed hydro generator capacity (kw)	8,990,867	9,582,000	18,866,456	19,878,000	47.7	48.0
Installed fuel generator capacity (kw)	4,934,810	5,110,000	56,667,730	59,900,000	8.7	10.2
Revenue from energy sales (thousands of dollars)	769,812	.....	5,647,672	5,400,000	13.6	...

Source Federal Power Commission. 1952 estimated on eleven months' operations.

Table II—Ten-Year Generation Record for Western Public Utilities

(in thousands of kwh)

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952*
Arizona	3,198,771	3,770,667	3,435,988	2,823,650	2,769,495	3,282,118	3,434,179	3,489,309	3,960,041	6,139,290
California	14,776,371	15,887,456	15,943,740	17,313,659	19,441,429	20,286,893	22,112,191	24,835,775	29,375,692	29,428,236
Colorado	1,097,260	1,136,831	1,128,655	1,168,151	1,375,653	1,592,067	1,630,959	1,855,610	2,263,192	2,287,825
Idaho	1,338,183	1,233,764	1,263,032	1,334,914	1,507,474	1,622,107	1,840,226	2,537,648	2,915,242	3,269,451
Montana	2,597,086	2,459,781	2,318,130	2,465,805	2,764,383	2,869,825	2,915,361	3,136,251	3,303,612	3,643,261
Nevada	3,228,132	3,244,462	2,590,404	2,488,076	2,908,189	3,607,239	3,591,363	3,210,425	2,547,243	3,517,791
New Mexico	470,931	511,165	556,892	604,992	753,897	845,696	910,885	1,014,453	1,171,878	1,340,444
Oregon	4,619,280	4,785,539	4,183,748	4,148,566	5,456,577	5,433,228	5,291,441	5,544,548	5,975,489	6,698,288
Utah	619,280	436,943	416,956	457,169	562,198	600,208	614,598	658,571	824,318	1,031,354
Washington	8,926,679	10,311,897	9,689,862	9,038,842	11,230,994	13,881,239	15,079,298	17,370,986	19,914,385	19,839,174
Wyoming	290,538	255,575	263,403	315,898	325,684	388,656	506,207	594,812	638,386	870,047

FPC reports *12 months ending November

Table III—Type and Capacity of Generators, November 1952

Division and State	Number of Utilities	Number of Plants	Total Capacity Kilowatts	Generator Capacity in Kilowatts of Plants Operated by: Water Power		Steam Power		Internal Combustion Engines	
				Number	Capacity	Number	Capacity	Number	Capacity
Arizona	19	49	1,319,480	13	982,180	10	258,000	26	79,300
California	20	168	5,945,333	126	2,763,167	29	3,137,025	13	45,141
Colorado	42	83	625,826	29	143,755	22	448,873	32	33,218
Idaho	13	51	591,084	43	586,180	1	400	7	4,504
Montana	11	29	613,049	18	532,120	5	77,968	6	2,961
Nevada	8	17	595,478	10	586,225	...	.....	7	9,253
New Mexico	21	40	340,091	4	24,910	14	273,972	22	41,209
Oregon	18	67	1,004,699	48	799,519	12	198,710	7	6,470
Utah	26	80	304,523	59	94,165	5	186,250	16	24,108
Washington	20	54	3,164,437	38	2,962,536	9	197,820	7	4,081
Wyoming	25	51	187,701	19	106,977	11	69,320	21	11,384
11 Western States	223	689	14,681,701	407	9,531,734	118	4,848,338	164	261,629
United States	1,529	3,778	79,777,829	1,427	19,877,811	1,045	57,807,032	1,306	2,092,986

Table IV—Number of Customers, November 1952

State	Total	Residential and Rural	Small Light and Power	Large Light and Power	Other
Arizona	234,110	200,976	30,954	1,551	629
California	4,041,471	3,420,486	562,079	41,062	17,844
Colorado	454,836	394,443	50,022	8,456	1,915
Idaho	207,005	178,060	28,149	455	341
Montana	194,526	168,125	22,834	2,969	598
Nevada	57,606	47,335	10,064	85	122
New Mexico	193,344	170,973	21,027	691	653
Oregon	534,377	459,282	70,430	2,501	2,164
Utah	211,399	190,514	18,309	1,886	690
Washington	800,817	711,051	84,393	3,302	2,071
Wyoming	90,405	78,680	10,051	1,515	159
11 Western States	7,019,896	6,019,925	908,312	64,473	27,186
United States	48,239,396	42,188,787	5,633,505	259,162	157,942

1952 Record 1953 Outlook

Production Electrical energy production in the 11 Western states for 1952 was 78,067,521,000 kwh. This compares with 72,889,478,000 kwh for 1951, an increase of 7.1%. To reflect accurately increased energy generation of Western systems there must be added 1.5 billion kwh. This is the estimated reduction from normal usage in the Northwest because of the curtailment program. Therefore increased energy use in the West was actually approximately 9.2% instead of the 7.1% figure above. Actual generation for 1952 was 19.6% of the U. S. total. In 1952 hydro generation in the West was 78% and thermal generation 22% of the total. In 1951 hydro was 73.7% of the total. The increase in hydro generation as compared with steam in 1952 was to be expected because of the exceptionally good water year in California in 1952.

Capacity Total installed capacity of power plants in the West was 14,681,701 kw as of November 1952, according to FPC figures. This is an increase of 6.05% over the capacity figure of 13,749,000 kw for 1951. During 1952 there were installed 1,535,000 kw of new plant capacity. This is short of the 1,880,200 kw scheduled because of slippage in delivery of some large units. Planned for 1953 is 1,686,884 kw; 1954, 2,265,317 kw.

Expenditures During 1952 Western utility systems, exclusive of federal, spent $491,315,000 as compared with a combined budget of $511,541,684 as reported a year ago. For fiscal 1952-53, federal agencies — USBR, Army Engineers and BPA — had an additional $240,886,000 to spend.

Budgets Budgeted for 1953 by nonfederal agencies is $490,798,000 — half a billion dollars in round numbers. Federal agencies have budgeted for fiscal 1953-54 another $274,039,000. The nonfederal budget is almost identical with last year's actual expenditures. It appears now that it will take about three-quarters of a billion invested in new plant each year to keep pace with the West's 10% annual load growth—that is, to install 1,620,000 kw of new generating capacity and to provide all the system components to deliver that amount of power to the customer's meter. Put another way, this means that the utilities of the West as a whole must in effect duplicate each year all the plants, transmission, distribution, substations, meters and other components of a system the size of the Southern California Edison Co.

Customers Western utilities served a total of 7,019,896 customers at the close of 1952. During 1952, 253,270 customers were added for a gain of 3.75%.

Construction Engineering awards for construction in the West fell off slightly in 1952, being $2,187,097,000 as compared with $2,254,570,000 for the year before. Even this high level of construction probably will be exceeded in 1953 because of eased federal restrictions in all building fields. Home building especially is expected to take an upturn. A recently announced housing project in southern California would exceed in size the famous 70,000-home Lakewood development in that area. Of the 1,000,000 home units built in 1952, some 200,000 were in California; the other Western states were similarly favored. Population shift West has created a shortage not yet satisfied and at least as many as last year are predicted. Collateral commercial and service building construction is indicated. With controls relaxed on building materials, this type of construction is expected to exceed that in the past two years. Industrial new construction may not equal that in 1952 but will still be substantial.

Appliances Prospects of an abundance of all types of appliances before midsummer presages a highly competitive market, with intense advertising and promotion, campaigns, shows, etc. Relatively high saturations mean that a great deal of selling will be aimed at the replacement market. Estimated sales in the West in 1952 give totals of: 300,000 refrigerators, 500,000 television sets, 100,000 ranges, 90,000 freezers, 283,000 washers, 50,000 dryers. With selling accelerated, credit easier and merchandise available, each of these is expected to be exceeded in 1953. The new houses built in themselves will make a market for new appliances. Television will start in many new markets this year.

Last year PG and E added two new 117,000-kw units to its Moss Landing steam plant bringing it to ultimate capacity of 575,000 kw

Western Utilities Maintain

Utilities budgets level off at the half billion dollar mark. Record construction set in 1952 will be maintained in '53

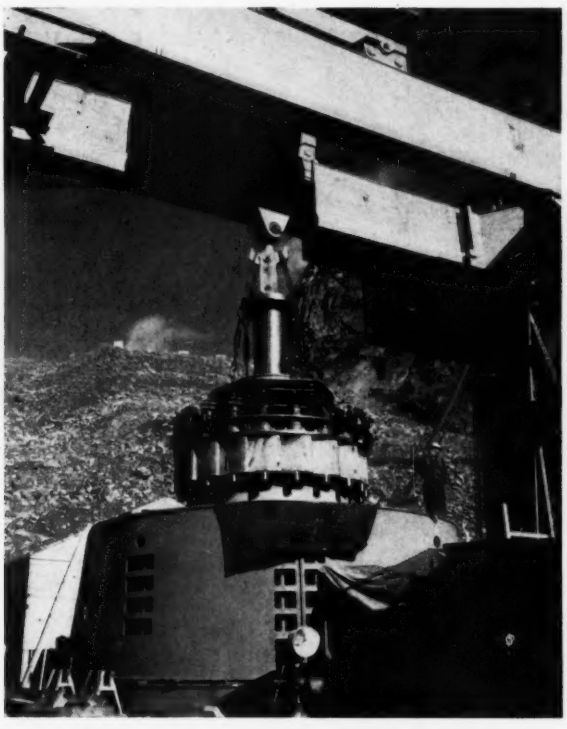
Total budget for utilities of the 11 Western states seems to have leveled off at the half billion dollar pace set in 1952. This spending rate would appear to be about that required to provide for the 10% annual load increase for Western systems. Actual spending for 1952 was $491,315,000. Budgeted for 1953 is $490,798,000, just under a half billion. Federal agencies, the U. S. Bureau of Reclamation, Army Engineers and the Bonneville Power Administration, expect $274,039,000 for fiscal 1953-54, up $33,150,000 over the $240,886,000 allocated for fiscal 1952-53.

Annual Peak for all Western systems for 1952 was 15,598,000 kw, an increase of a million kilowatts over the 1951 peak of 14,597,000 kw. To the 1952 peak of 15,498,000 kw there must be added 600,000 kw, which is the amount of peak curtailment on the Northwest Power Pool because of the current power shortage in that region. The adjusted 1952 peak would then be 16,198,000 kw, or an increase of 11% over the year before.

New Generation required to meet a 10% load growth would be 1,500,000 kw, in round numbers, for 1952. Actually, there were added 1,535,000 kw of new generation. Scheduled for 1953 is 1,686,884 kw. For 1954 there is planned the amazing capacity of 2,265,317 kw, and for 1955 almost the equal—2,216,950 kw. New steam capacity is assuming an ever larger proportion of the total, year by year. For instance, in 1953 there are scheduled 715,000 kw of steam as against 971,884 kw hydro. But for 1954, according to plans, 1,522,250 kw of steam will be brought in as compared to 743,067 kw hydro.

Power Reserves: Had not the Northwest experienced a dry year, generating capability would have been sufficient to meet load in all sections of the Far West. This winter's load in the Northwest would have been an estimated 600,000 kw greater than the peaks recorded, had it not been for enforced curtailment. Generation would have been approximately 1.5 billion kwh more than it was for the same reason. Other sections of the West had small but ample reserve generation. With normal water the outlook for this year is satisfactory for all sections.

Steam Generation, as noted last year, will continue to constitute almost all the new capacity built in the Pacific Southwest in the future. The



Idaho Power uses labor-saving methods in building 138-kv American Falls line (left). Right: Erecting Yale unit, Pacific Power & Light

Record Pace of '52

exception for a few years would be new plants on the upper Colorado River.

New Transmission lines built during 1952 totaled 4,148 miles. Of this 2,554 miles were federal and 1,594 miles nonfederal. For 1953 there are planned 1,384 miles of federal lines and 1,877 miles for nonfederal agencies for a total of 3,261 miles. Plans of the Bonneville Power Administration include major lines to operate at both 300 kv and 345 kv.

Distribution Line Mileage built in 1952 was 5,785 line miles, all nonfederal. For 1953, 5,566 line miles are planned.

Substation Capacity installed in 1952 totaled 5,922,841 kva, of which 4,087,007 kva were in transmission substations and 1,835,834 kva in distribution. Planned for this year is a total of 6,012,285 kva, of which 4,391,530 kva are for transmission and 1,620,785 kva for distribution.

In the pages that follow will be found statements by federal and nonfederal agencies reviewing major construction performed during the past year and that planned for 1953.

Federal

Army Engineers

Projects of the U. S. Army Engineers will be found listed under the states in which they are located.

Bonneville

Report of the Bonneville Power Administration is on page 110.

REA

REA borrowers in eleven Western states received nearly $42,000,000 in electrification loans during the calendar year 1952, an increase of nearly $13,000,000 over the year before. The cumulative total of loans approved to these states passed the $300,000,000 mark during the year.

More than 14,000 miles of line and 29,000 consumers were added by REA borrowers in 1952, both figures representing considerable gain over 1951 activities.

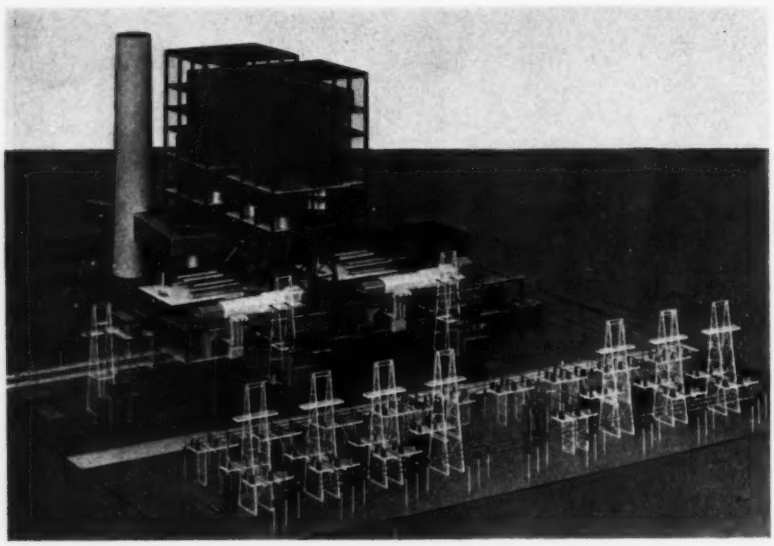
The number of unelectrified farms on July 1, 1952, was whittled down from 58,000 to 44,000, a decrease that indicates the steadily approaching point of complete area coverage. California had 8,200 unelectrified farms, followed by New Mexico with 7,900. At the bottom of the list was Nevada with only 1,088 farms yet to be served.

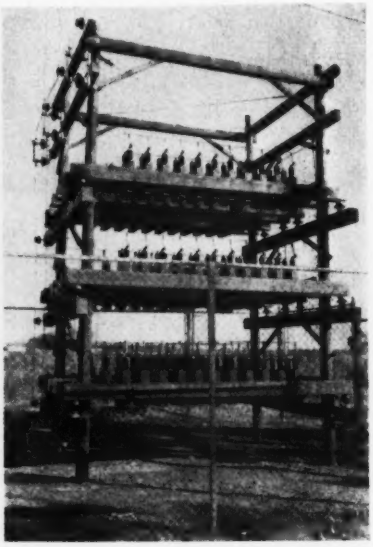
Farm electrification in the eleven state area stood at 90.5%, compared with the REA estimated national average of 88.1%.

Tabulations showing the relative progress of REA borrowers appear on pages 98 and 99.

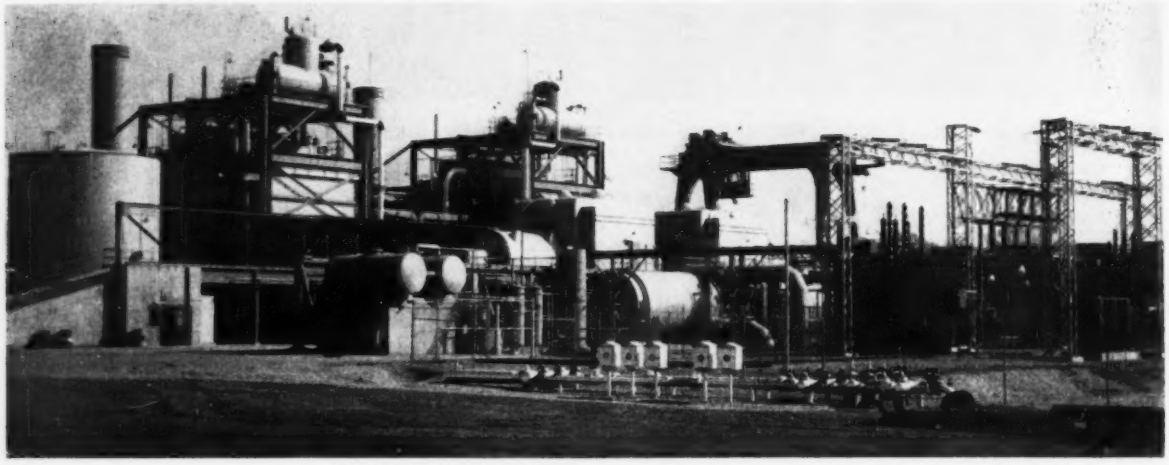
Bureau of Reclamation

Reports on status of Western USBR projects will be found listed under the states in which they are located. A table will be found on page 95 showing current and future bureau power projects. The comprehensive transmission line construction program of USBR will be found on page 94.





Artist's view (left) of 200,000-kw Saguaro plant, Arizona Public Service. Right: Capacitor installation, Salt River Power District



Two additional units bringing plant to capacity of 140,000 kw are being installed at Highgrove plant of California Electric Power

Arizona

Arizona Public Service

Arizona Public Service Co. was formed in 1952, merging Central Arizona Light & Power Co. and Arizona Edison Co., both utilities operating within the State of Arizona. With the merger Arizona Public Service Co.'s operations are now practically statewide, operating in 10 of the 14 counties and covering an area of approximately 37,000 square miles, including the wholly owned subsidiary, Northern Arizona Light & Power Co., serving the northern part of Arizona.

Construction for the year 1952 amounted to about $6,500,000 for transmission, distribution and substation facilities.

Conversion of distribution lines and facilities from 2,300/4,160 v to 7,200/12,500 is still continuing at the rate of approximately 1,200 kva per month.

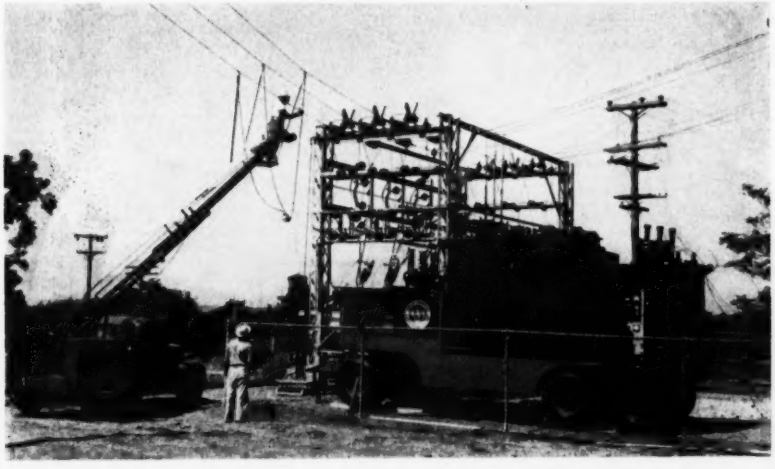
Late in 1952 the company shut down its frequency changer equipment used for 25 years in converting 25-cycle power to 60-cycle, and for the last ten years converting 60-cycle to 25-cycle power, for its neighboring utility. The frequency changers are being removed to make space available for shop facilities. This completes the conversion program to all 60 cycles begun many years ago.

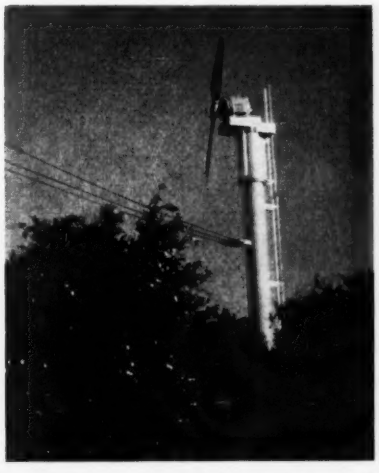
The company has expanded its microwave communication system to include additional areas with very successful results.

Construction of a new 200-mw power plant was begun during October to be known as the Saguaro plant near Red Rock, Ariz. This plant will have two 100-mw units, the first to be in commercial operation by June 1954, and the second unit one year later.

The 1953 construction program calls for an expenditure of approximately $16,000,000. More than $9,000,000 will be spent on construction of the new Saguaro generating plant. There will be approximately 50 miles of 69-kv transmission line built, 20 miles of 115-kv transmission line and additional substation facilities. Electric service will be extended to the San Manuel Copper Co.'s new mining project near Oracle, Ariz., and there are various other substantial increases

Detroit Dam, 100,000-kw power house (left) being built by Army Engineers. Right: Typical rural lines being built by REA borrowers





Substation (left) built by Coast Counties Gas & Electric. Right: Citrus grove wind machines are important load of city of Riverside

in load requiring new facilities in connection with our national defense program.

The load trend growth of the Arizona Public Service Co. system shows approximately 12% per year. Peak load experienced in 1952 was 277,000 kw.—*George H. Groh, vice-president.*

Boulder Canyon Project, USBR

Installed in the Hoover power plant during 1952 were units A-3 and A-4, both 82,500 kw capacity, and unit A-9, a 50,000-kw unit. With the placement in service of these units, the total capacity of the power plant was brought to 1,249,800 kw. One unit remains to be installed to bring the plant to its full generating capacity of 1,332,300 kw.

Salt River Power District

With completion of the new 34,500-kw generating unit at the Kyrene steam station in May 1952, plans were immediately set in motion for the installation of another unit at the same location. The second unit, scheduled for completion by June 1954, will have a capacity of 69,000 kw at 15 psig hydrogen. A $13,500,000 bond issue has recently been approved to meet the cost of the new installation and anticipated transmission and distribution line growth for the next few years.

As a part of the rehabilitation program made possible by the Federal Reclamation Law, extensive construction and repairs were undertaken at Stewart Mountain Dam on the Salt River. Included were a concrete addition to the east buttress, installation of rubber seals on the spillway gates, metal spraying the spillway gates, rebuilding a portion of the east spillway abutment, and drilling and grouting portions of the arch, buttresses and gravity sections. The increased strength of the structure will allow storage of an additional 10,000 acre-ft of water above the previous limitation.

Frequency Changers

In order to better meet the requirements of the seasonal varying 25- and 60-cycle loads and capabilities, two frequency changers, along with two transformer banks, have been purchased from the Arizona Public Service Co., and are being moved, rewound

Current and Future Power Transmission Lines on USBR Projects

Project	State or States	Line Terminals		Rating in Kilovolts	Line Length in Miles	Construction Type	Estimated Year of Completion
		Terminal A	Terminal B				
Minidoka	Idaho	American Falls power plant	Minidoka Dam	115	35	wood pole H frame	1956
Palisades	Idaho	Palisades power plant	Idaho Falls	115	51	wood pole H frame	1956
Palisades	Idaho	Idaho Falls	Michaud	115	51	wood pole H frame	1956
Palisades	Idaho	Goshen	Michaud	115	40	wood pole H frame	1956
Palisades	Idaho	Michaud	American Falls power plant	115	25	wood pole H frame	1956
Central Valley	Calif.	Folsom power plant	Nimbus power plant	115	7	wood pole H frame	1954
Central Valley	Calif.	Central Valley Project	Bonneville Power Admin.	230	118	single circuit wood and steel	1955
Central Valley	Calif.	Folsom	Elverta	230	20	steel tower	1954
Central Valley	Calif.	Elverta	Elk Grove	115	23	steel tower	1956
Central Valley	Calif.	Folsom	Elk Grove	115	27	steel tower	1956
Central Valley	Calif.	Ygnacio	Grayson	69	5	wood pole	1955
Davis Dam	Ariz.	Gila	Yuma	34.5	12	wood pole	1955
Davis Dam	Ariz.	Gila	Wellton-Mohawk	34.5	38	wood pole	1955
Davis Dam	Ariz.	Phoenix	Tucson	115	12*	wood pole H frame	1954
Davis Dam	Ariz.	Saguaro	Oracle	115	21	wood pole H frame	1954
Davis Dam	Ariz.	Saguaro	E.D. 5	115	12	wood pole H frame	1954
Rio Grande	N.M.	Belen	Willard	115	53	wood pole H frame	1952
Fort Peck	Mont.-N.D.	Glendive	Williston	115	92	wood pole H frame	1952
Fort Peck	Mont.	Fort Peck	Glendive	230	130	steel towers	1955
Mo. River Basin	Wyo.	Thermopolis No. 2	Lovell No. 2	115	84	wood pole H frame	1958
Mo. River Basin	Mont.-N.D.	Glendive	Bismarck	230	208	steel tower	1957
Mo. River Basin	Mont.	Miles City	Yellowtail	115	142	wood pole H frame	1959
Mo. River Basin	Mont.-Wyo.	Yellowtail	Hot Springs	115	95	wood pole H frame	1959
Mo. River Basin	Mont.	Livingston	Billings	115	116	wood pole H frame	1956
Mo. River Basin	Mont.	Miles City	Broadus	69	80	wood pole H frame	1956
Mo. River Basin	Mont.	Broadus	Ashland	69	42	wood pole H frame	1956
Mo. River Basin	Wyo.	Boysen	Shoshone	34.5	12	single pole wood	1959
Mo. River Basin	Wyo.	Shoshone	Riverton	34.5	24	single pole wood	1959
Mo. River Basin	Wyo.	Garland	Lovell	69	18	wood pole H frame	1952
Mo. River Basin	Wyo.	Thermopolis	Lovell	115	84	wood pole H frame	1952
Mo. River Basin	Wyo.-Mont.	Lovell	Yellowtail	115	46	wood pole H frame	1953
Mo. River Basin	Wyo.	Hanover	Lovell	34.5	67	single pole wood	1955
Mo. River Basin	Wyo.	Heart Mountain	Thief Creek	115	35	wood pole H frame	1957
Mo. River Basin	Wyo.	Thief Creek	Lovell	115	58	wood pole H frame	1955
Mo. River Basin	S.D.	Fort Randall	Oahe	230	135	steel tower—dbl. cir.	1953
Mo. River Basin	S.D.	Oahe	Mobridge	230	76	steel tower	1955
Mo. River Basin	S.D.	Gavins Point	Sioux Falls	115	90	wood pole H frame	1956
Mo. River Basin	S.D.-Iowa	Fort Randall	Sioux City	230	122	steel tower—dbl. cir.	1953
Mo. River Basin	S.D.	Oahe	Midland	115	54	wood pole H frame	1953
Mo. River Basin	S.D.	Big Bend	Big Bend Tap	230	4	steel tower	1960
Mo. River Basin	S.D.	Big Bend Tap	Huron	230	65	steel tower	1956
Mo. River Basin	S.D.	Huron	Watertown	230	71	steel tower	1956
Mo. River Basin	S.D.	Sioux Falls	Brookings	115	60	wood pole H frame	1952
Mo. River Basin	S.D.	Brookings	Watertown	115	50	wood pole H frame	1952
Mo. River Basin	S.D.	Watertown	Huron	115	167	wood pole H frame	1952
Mo. River Basin	S.D.	Huron	Armour	115	84	wood pole H frame	1952
Mo. River Basin	S.D.	Armour	Fort Randall	115	20	wood pole H frame	1952
Mo. River Basin	S.D.	Fort Randall	Gavins Point	115	43	wood pole H frame	1952
Mo. River Basin	S.D.	Fort Randall tap	Fort Randall	115	24	wood pole H frame	1953
Mo. River Basin	S.D.	Gavins Point tap	Gavins Point	115	8	wood pole H frame	1956
Mo. River Basin	S.D.	Gavins Point tap	Sioux Falls	115	94	wood pole H frame	1952
Mo. River Basin	S.D.	Rapid City	Midland	115	109	wood pole H frame	1952
Mo. River Basin	S.D.	Fort Randall	Winner	115	70	wood pole H frame	1952
Mo. River Basin	N.D.	Bismarck	Jamestown	230	98	steel tower	1953
Mo. River Basin	N.D.	Garrison	Bismarck	230	65	steel tower—dbl. cir.	1952
Mo. River Basin	N.D.-S.D.	Bismarck	Mobridge	230	95	steel tower	1954
Mo. River Basin	N.D.	Bismarck	De Vaul	69	42	wood pole H frame	1952
Mo. River Basin	N.D.	De Vaul	Shields	69	43	wood pole H frame	1956
Mo. River Basin	N.D.	Jamestown	Fargo	230	97	steel tower	1956
Mo. River Basin	N.D.	Edgeley	Ellendale	115	26	wood pole H frame	1955
Mo. River Basin	N.D.-S.D.	Ellendale	Groton	115	59	wood pole H frame	1955
Mo. River Basin	N.D.	Lakota	Grand Forks	115	63	wood pole H frame	1955
Mo. River Basin	Mont.	Canyon Ferry	East Helena	115	15	wood pole H frame	1952
Mo. River Basin	Mont.	Canyon Ferry	Billings	115	234	wood pole H frame	1957
Mo. River Basin	Mont.	Yellowtail	Billings	115	44	wood pole H frame	1954
Colo.-Big Thompson	Colo.	Flatiron	Valmont	115	26	wood pole H frame	1954
Colo.-Big Thompson	Colo.	Salida	Gunnison	115	59	wood pole H frame	1952
Colo.-Big Thompson	Colo.	Flatiron	Cheyenne-Greeley tap	115	36	wood pole H frame	1952
Colo.-Big Thompson	Colo.	Estes	Pole Hill	115	9	wood pole H frame	1952
Kendrick	Wyo.	Hanna	Sinclair	34.5	28	single pole wood	1952
Kendrick	Wyo.	Sinclair	Rawlins	34.5	6	single pole wood	1953
Kendrick	Wyo.	Seminoe	Baroil	34.5	36	single pole wood	1952
Mo. River Basin	Wyo.	Sinclair	Rock Springs	115	114	wood pole H frame	1954
Mo. River Basin	Wyo.	Rock Springs	Westvaco	115	35	wood pole H frame	1955
Mo. River Basin	Wyo.-Neb.	Alcova	Gering	115	145	wood pole H frame	1956
Mo. River Basin	Wyo.	Alcova (2 circuits)	Fremont	115	15	wood pole H frame	1955
Mo. River Basin	Wyo.	Casper	Midwest	69/115	45	wood pole H frame	1954
Mo. River Basin	S.D.-Neb.	Fort Randall	Grand Island	230	155	steel towers	1956
Mo. River Basin	Neb.	Gavins Point	Belden	115	40	wood pole H frame	1954
Mo. River Basin	Iowa-Neb.	Sioux City	Omaha	230	107	steel towers	1956
Eklutna	Alaska	Eklutna	Palmer	115	15	wood pole H frame	1952
Eklutna	Alaska	Eklutna	Anchorage	115	26	wood pole H frame	1953

*Construct six miles new line, salvage six miles of old Phoenix-Tucson No. 2 Line.

and installed at Mesa. With the frequency changer that has recently been moved from the Cross Cut generating station to the new site, a frequency changer capacity of 30,000 kw will be available to interconnect the 25-cycle and 60-cycle systems.

Other current engineering and construction activities include installation of several substations, capacitor banks, GCX impedance relays and carrier current telemetering and phase comparison relaying. Two line office and warehouse buildings have been constructed on the eastern and western sides of the project for decentralized line crew operations, and a hoist tower and dock are being constructed at the central Phoenix warehouse. In addition, four resident operators' houses at Roosevelt Dam hydro station, an irrigation field office and a 96-ft measuring bridge over the Arizona Canal have been completed during the year. Other power district work including conversion of the Mormon Flat Dam hydro station from manual to remote

semiautomatic operation is now in progress.—*T. M. Morong, chief engineer.*

Tucson GEL&P

Major 1952 construction activity consisted of advance work on a 20,000-kw generating unit that is scheduled for operation this summer. The cooling tower and oil storage tanks have been completed as well as most foundations and steel structure of buildings. The boiler is being erected at the present time.

This unit will double the capacity of the DeMoss-Petrie station. A 40,000-kw unit, which is scheduled for operation in the summer of 1954, will quadruple the present size of the station.

Most of the 1952 construction covered facilities for increased growth such as new substations, new lines and larger conductors on existing lines. The general program for 1953 is expected to be quite similar with the exception of 42 miles of 44,000-v transmission line. Construction was also started on the first phase of an underground system for the downtown area of Tucson.

We set 6,333 new electric meters in 1952 compared to 4,303 in 1951.—*C. E. Hockings, executive assistant.*

California

Burbank PS Dept.

Capital expenditures for 1952 totaled $2,350,000, with $2,750,000 budgeted for 1953. System energy consumption this year was 295,021,800 kwh, an increase of 14.71% over 1951. While this increase is considerably lower than the 24% increase experienced in 1951 over 1950, continuing increase of not less than 10% is in prospect for 1953.

Peak demand of the system was 59,350 kw, but resources of the system were only 40,000 kw in steam-electric generating plant and 5,109 kw of firm power from Hoover Dam. A 30,000-kw plant addition, originally planned to be in operation in November 1952, has suffered several setbacks in the manufacturing schedules. The unit is now scheduled for completion in September 1953. Deficiency in generating plant capacity was made up through purchase of capacity and energy under power interchange agreements with Glendale and Los Angeles.

A street-lighting program initiated several years ago will continue through 1953 with $90,000 budgeted.

Continuing a program started three years ago for the modernization of the secondary distribution system, 43 pole lines, aggregating nearly 10 pole-line miles, were rebuilt in the older residential areas of the city this year. These lines, installed prior to 1936, were designed for demands averaging 200 w per domestic consumer and are proving very inadequate for present-day demands of nearly 1,000 w per domestic consumer. In rebuilding these lines, which are largely physically deteriorated as well as functionally obsolete, the new improved standards include: (1) The utilization of 100-ft spans instead of 150-ft spans, to reduce length of service drops and to eliminate crossings over private property. (2) Larger and more closely spaced distribution transformers to provide higher capacity and to reduce loading on the secondary conductors. (3) Heavier conductors to reduce voltage drop and lamp flicker.

Backlog on lines in need of rebuilding is now 117 lines totaling approximately 26 miles. Present planning calls for rebuilding at the rate of about 50 lines per year, 30 for depreciation and 20 for pickup of the backlog.

California Electric Power

Construction work was completed on the installation of two 30,000-kw preferred standard generating units at

Current and Future Development of USBR Power Projects

Project	State	River	Purpose*	Name of Plant	Yr. of Initial Operation	Present kw	Present No. of Units	Ultimate kw	Ultimate No. of Units
Boulder Canyon	Ariz.-Nev.	Colo.	I,P,FC	Hoover	1936	1,249,800	18	1,332,300	19
Hungry Horse	Mont.	Flathead	P,FC	Hungry Horse	1952	142,500	2	285,000	4
Mo. River Basin	Wyo.	Big Horn	I,P,FC	Boysen	1952	15,000	2	15,000	2
Mo. River Basin	Mont.	Missouri	I,P,FC	Canyon Ferry	1953	0	0	50,000	3
Colo.-Big Thompson	Colo.	Trans. Mtn. Division	I,P	Flatiron	1953	0	0	63,000**	2
Colo.-Big Thompson	Colo.	Trans. Mtn. Division	I,P	Pole Hill	1953	0	0	30,000	1
Kendrick	Wyo.	North Platte	I,P	Alcova	1954	0	0	36,000	2
Central Valley	Calif.	American	P,FC	Folsom	1954	0	0	162,000	3
Eklutna	Alaska	Eklutna Lake Division	P	Eklutna	1954	0	0	30,000	2
Central Valley	Calif.	American	P,FC	Nimbus	1955	0	0	13,500	2
Yakima	Wash.	Yakima	I,P	Chandler	1955	0	0	12,000	2
Mo. River Basin	Mont.	Missouri	I,P	Little Porcupine	1955	0	0	18,000	3
Provo River	Utah	Provo	I,P	Deer Creek	1956	0	0	5,000	Undetermined
Weber Basin	Utah	Weber	I,P,FC	Gateway	1956	0	0	4,000	Undetermined
Weber Basin	Utah	Weber	I,P,FC	Wanship	1956	0	0	1,400	Undetermined
Yakima	Wash.	Roza Canal	I,P	Roza	1956	0	0	10,000	2
Minidoka	Idaho	Snake	I,P	American Falls	1956	0	0	30,000	3
Palisades	Idaho	Snake	I,P	Palisades	1956	0	0	114,000	4
Mo. River Basin	Mont.	Marias	I,P,FC	Tiber	1957	0	0	2,000	Undetermined
Mo. River Basin	Mont.	Powder	I,P	Moorhead	1957	0	0	8,000	Undetermined
Collbran	Colo.	Bonham-Cottonwood pipe line	I,P	Molina	1957	0	0	5,000	Undetermined
Mo. River Basin	Mont.	Big Horn	I,P,FC	Yellowtail	1957	0	0	200,000	4
Mo. River Basin	Wyo.	North Platte	I,P	Glendo	1958	0	0	24,000	Undetermined
Collbran	Colo.	Mesa pipe line	I,P	Cameo	1958	0	0	2,400	Undetermined
Central Valley	Calif.	Sacramento	I,P	Sacramento Canals	1958	0	0	20,000	Undetermined
Mo. River Basin	Wyo.	North Platte	I,P	Fremont Canyon	1958	0	0	48,000	Undetermined
Mo. River Basin	Wyo.	Clarks Fork	P,FC	Thief Creek	1958	0	0	60,000	3
Mo. River Basin	Wyo.	Sunlight	P,FC	Sunlight	1958	0	0	20,000	2
Mo. River Basin	Mont.	Missouri	P,FC	Portage	1958	0	0	20,000	2
Colo.-Big Thompson	Colo.	Trans. Mtn. Division	I,P	Big Thompson	1959	0	0	6,700	1
Mo. River Basin	N.D.	Souris	I,P,FC	Crosby	1959	0	0	48,000	6
Mo. River Basin	N.D.	Souris	I,P,FC	Des Lacs	1959	0	0	60,000	10
Mo. River Basin	S.D.	Mo. Oahe Canal	I,P	Miller Drop	1959	0	0	180,000	4
Mo. River Basin	Mont.	Madison	P,FC	Lyon	1959	0	0	24,000	3
Mo. River Basin	Wyo.	Clarks Fork	P,FC	Baldridge	1959	0	0	30,000	3
Mo. River Basin	Wyo.	Clarks Fork	P,FC	Hunter Mountain	1959	0	0	12,000	2
San Luis	Colo.	Rio Grande	I,P,FC	Wagon Wheel Gap	1960	0	0	50,000	Undetermined
Mo. River Basin	Mont.	Yellowstone	P,FC	Arseraka (Mission)	After 1960	0	0	50,000	Undetermined
Mo. River Basin	Wyo.	Tongue River	P,FC	Tongue River	After 1960	0	0	25,000	Undetermined

*Abbreviations under Purpose: I—Irrigation; P—Power; FC—Flood Control.

**Does not include reversible synchronous motor with output of approximately 6,700 kw.

the outdoor Highgrove steam plant. The first unit was placed in service in May and the second unit in July.

Construction work is under way on an additional unit, of 40,000 kw capacity, scheduled for completion in November 1953. Orders are being placed for the installation of the fourth generating unit scheduled for completion in November 1955. The fourth unit will be 40,000 kw capacity.

Work at hydroelectric plants included replacement of 3,300 ft of 54-in. wood-stave flow line; addition of a reinforced gunite face on a concrete storage dam in the High Sierra; replacement of auxiliary equipment including generator voltage regulators, exciter motor and starter; and station batteries. Extensive maintenance work also completed included replacement of one set of waterwheel buckets and the cleaning and treating of two steel penstocks.

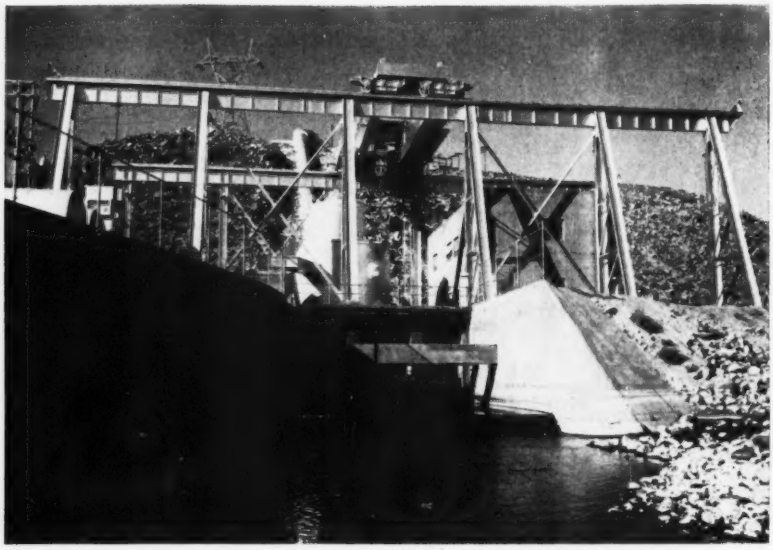
In the transmission category, construction was completed on eight miles of 115-kv, 4/0 copper, twin-circuit transmission line and terminal facilities connecting the Highgrove steam plant to the company's system at its San Bernardino substation. Structures on the first three miles out of the Highgrove switchyard provide for the addition of a third circuit at a later date. Other transmission expenditures included the addition of supervisory control of switching equipment at remote, unattended substations; survey and right-of-way work on future transmission lines; reconstruction of the 115-kv bus at a main line substation; installation of additional 115-kv oil circuit breakers; and the addition of relay equipment at another main line substation.

During the late summer the company carried out a network calculating board study in connection with a proposed conversion of the transmission system to 115-kv operation. Engineering work is currently in progress evaluating the findings of this study.

Transmission substation work included the relocation of a 30,000-kva transformer bank and related equipment to a point closer to the area to be served.

Distribution construction work included increased transformer capacity totaling 13,400 kva in new substations and 47,300 kva net increase in existing substation capacity.

Other distribution expenditures included the construction of 13 miles of 4/0 ACSR, 33-kv, wood-pole line to provide dual service into a rural and mountain area in addition to increasing the capacity of the loop circuit of which the new line is a part; addition of fixed and switched capacitor installations; addition of regulators at selected substations; modernization of oil circuit breaker installations; expansion of existing radio communication facilities; cutover of existing substations and lines to 4-kv or 12-kv operation; construction of new commercial and construction office buildings; routine work of reconductoring and repoling lines in selected areas.



Lower Owens Gorge plant completed last year by Los Angeles Dept. of Water & Power

1953 Construction Program

The principal construction scheduled at fuel-electric generating plants will consist of the addition of the third generating unit at the Highgrove steam plant. The third generating unit, of 40,000 kw capacity, will be similar in general to the first two units placed in operation during 1952.

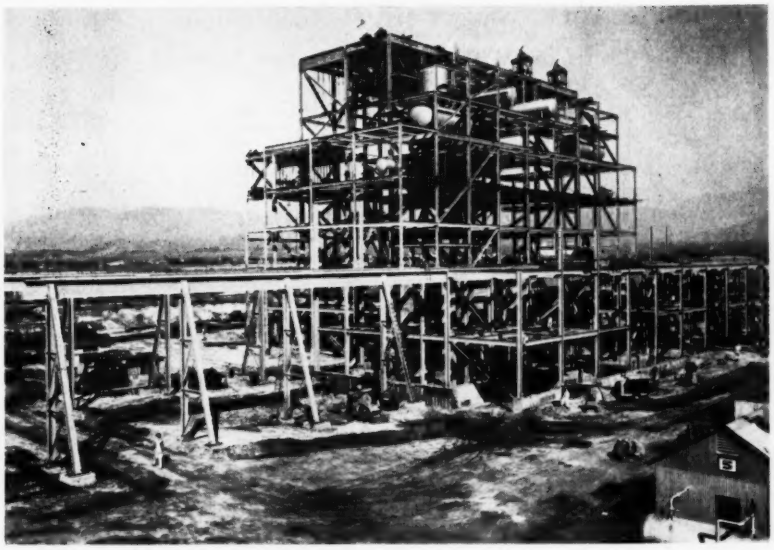
Major construction at hydroelectric plants will consist of refacing a storage dam in the High Sierra, using redwood in place of the original native timber facing.

Other budgeted work will include replacement of generator voltage regulator equipment; construction of garage and shop buildings; additions to existing buildings; replacement of approximately 1,100 ft of penstock with a 54-in. line; replacement of 540 ft of wood-stave flow line; and other improvements to auxiliary hydro and electric equipment.

The principal transmission expenditures provide for additional transmission lines originating at the new Highgrove steam plant switchyard. Facilities to be constructed include two short sections of new transmission line, including terminal facilities, and the stringing of one short section of circuit on existing towers. One line, approximately three miles in length, will be of double-circuit construction on steel towers and will connect the Highgrove steam plant to an existing transmission line, sectionalizing the existing line at the point of juncture. One circuit will be 4/0 copper and the other 2/0 copper. The second transmission line, 28 miles in length, will be of 2/0 copper on wood poles and will constitute the second circuit connecting the Highgrove steam plant and an existing main line substation. Survey and right-of-way work also will be carried on in preparation for the construction of additional transmission lines at a later date. One existing main line substation will be rebuilt in 1953 for eventual operation at 115 kv.

Other items of transmission expenditures will include replacement or modernization of oil circuit breakers; installation of magnesium anodes on selected steel towers; rebuilding and rerouting a portion of an existing line; and the continuation of the program of repoling lines in selected locations.

The distribution budget, in addition to the appropriation for customer extensions, is for expansion, reconstruction of existing lines and substations; construction of an operating office and storeroom; improvement of existing buildings; addition of capacitors in selected locations; expansion of radio communication facilities by the addition of mobile units; addition of remote control features for supervision and remote operation of an existing substation serving a metro-



Steelwork is complete on Valley steam plant of Los Angeles Dept. of Water & Power

politan area; modernization of oil circuit breakers in existing substations; and the usual amount of rebuilding, reconductoring and repoling of lines in selected locations under an annual replacement schedule.

The expansion program at substations contemplates an increase of 50,600 kva in transformer capacity.—*W. T. Johnson, vice-president and executive engineer.*

California-Pacific Utilities

Our review of projects completed during 1952 requires making special mention of the construction of 35 miles of new 69-kv transmission line, which adds another source of power to the John Day district of our Eastern Oregon Division. This new transmission further interconnects this operating district with the Idaho Power Co. system in eastern Oregon. The construction of this new line also enabled us to provide power service to the Bates, Ore., mill of the Oregon Lumber Co. and add approximately 350 new commercial and residence customers in this community. A new 8,000-kva substation at Prairie City, Ore., also was a part of this project.

During the past year the company also acquired the electric system in the city of Henderson, Nev. Approximately 1,500 new electric customers were added through this acquisition, which also required immediate construction of new distribution systems for two housing projects involving approximately 450 new homes. This rapidly growing community houses most of the industrial workers at the Henderson Basic Magnesium plant, which is now operated by a number of large electrochemical companies, some of which have important defense contracts.

A major portion of last year's construction budget was devoted to the addition of new capacity to distribution substations and lines. A substantial part of the 150 miles of new distribution lines provided electric service to new rural customers, which thereby practically completes the job of providing electric service for most of the rural customers in the company's service area.

Among major projects for 1953 will be the construction of 25 miles of new 69-kv transmission line from La Grande to Elgin, Ore. This line will supply 3,000 kw of capacity to the Wallowa County system of Pacific Power & Light Co., which will also construct a new 69-kv line from Enterprise to Elgin. A long-term agreement covering this system interconnection has been executed by officials of Pacific Power & Light Co. and our company. A new 1,500-kva substation at Elgin will be built to provide additional capacity for this growing community, which is also the location of extensive lumber mill operations.

An agreement has been completed to take over the operation of the electric system at Herlong, Calif., which services approximately 1,500 customers of this community made up of workers and their families at the nearby Sierra Army Ordnance Depot. Extensive housing additions planned for this community will therefore require considerable additions to electric distribution on our northern California Lassen Division. Similar growth of the town of Henderson, Nev., where a third new-housing project is getting under way, will require extensive distribution system additions for approximately 400 new customers. Our 1953 budget for added distribution system capacity and new extensions over the balance of the company's system will probably equal, if not exceed, the budget for last year.—*E. K. Albert, vice-president and chief engineer.*

Central Valley Project, USBR

Construction began in April 1952 on the 162,000-kw Folsom power plant on the project's American River division near Folsom, Calif. During the same month the contract for furnishing and installing the plant's three 54,000-kw generators was awarded. (Folsom Dam is under construction by the United States Corps of Engineers.) In July construction began on the Nimbus Diversion Dam and Nimbus power plant, a 13,500-kv-capacity installation. Folsom power plant is planned to be in full operation by early 1955. Full Nimbus power generation is scheduled to be available by early spring of 1955.

Completed on the project in 1952 were 42 miles of the 230-kv-capacity Shasta-Tracy lines No. 1 and 2, extending from Madison to Rio Vista and an additional 26 miles of the line from Rio Vista to Tracy. Erection of the steel towers for the 230-kv, 20-mile-long Folsom-Elverta transmission line is about 30% completed.

Coast Counties G&E

Coast Counties Gas & Electric Co. expended approximately $1,592,000 for new and improved facilities during 1952. It is estimated that $1,314,000 will be spent in 1953.

The 1952 program included: (1) Conversion of the Morgan Hill-Watsonville 60-kv transmission line to 110 kv, thus providing alternate 110-kv feeds to the Green Valley substation, located near Watsonville; (2) installation of one three-phase 20,000/25,000/33,333-kva transformer at Green Valley substation, also the installation of a duplicate transformer at Paul Sweet substation, located near Santa Cruz; and (3) addition of six 2,000-kva unit-type distribution substations and one 3,750-kva distribution substation. The system peak demand for 1952 was 54,600 kw.

Major items scheduled for 1953 are: (1) Conversion of the Green Valley-Santa Cruz 60-kv transmission line to 110 kv, a conversion that will provide

alternate 110-kv feeds to Paul Sweet substation; (2) construction of additional 24-kv lines from Paul Sweet substation into Santa Cruz and to the San Lorenzo Valley; and (3) addition of two 3,750-kva unit-type substations, one in Santa Cruz and one in Watsonville.—*R. L. Harden, vice-president and regional manager.*

Folsom Dam, Army Engineers

Failure of an earthfill cofferdam because of January floods on the American River in northern California will delay construction on the Folsom Dam and power plant project for several months. Completion of the first 54,000-kw unit had been scheduled for June 1954, the second in August and the third in October of the same year.

Glendale PS Dept.

The budget for capital expenditures for the current fiscal year is somewhat higher than last year, primarily because of the construction and purchase of materials for the addition of the third unit to our generating plant. Certain phases of other construction work, however, were cut very sharply, principally underground construction and street lighting improvements, where no capital additions of any importance were made. The program of replacing older overhead lines that have passed their economic life was continued throughout the year. The capital expenditures on a fiscal year basis for 1951-52 were $1,156,500 and for the current year it is estimated that we will spend approximately $1,950,000 for new construction.

Construction work on the addition to the steam plant progressed satisfactorily during the year and it appears that the unit should be on the line by October of this year. No additions were made in substation capacity or to the transmission system during the year.

Increase in the peak demand was somewhat lower, while increase in energy consumption was higher than in 1951. The peak demand of 42,600 was 3.1% above 1951, and the kwh consumption of 172,000,000 was an increase of 7.8% over last year. During the year 3,100 kva of distribution transformer capacity were added to the system, as well as 1,027 new service connections.—*L. W. Grayson, chief engineer and general manager.*

Imperial Irrigation District

During the year 1952 Imperial Irrigation District spent approximately $3,000,000 in keeping pace with con-

Status of Western REA-Financed Systems

Borrower	Cumulative Construction Loans 12-31-52	1952 Construction Loans**	Miles Energized 12-1-52	Consumers Connected 12-1-52
ARIZONA	**$16,057,906**	**$ 940,000**	**3,236**	**10,752**
Navopache Elec. Co-op., Lakeside	2,848,000	310,000	633	2,419
Sulphur Springs Valley Elec. Co-op., Willcox	4,637,828	630,000	755	3,302
Littlefield Elec. Co-op., Littlefield	20,000	...	14†	11†
Graham County Elec. Co-op., Pima	3,130,672	...	548	2,170
Trico Elec. Co-op., 3800 Oracle Road, Tucson	3,101,368	...	491	706
Verde Elec. Co-op., c/o Navopache Elec. Co-op. Inc., Lakeside	550,752	...	131†	339
Mohave Elec. Co-op., Kingman	777,000	...	212	400
Duncan Valley Elec. Co-op., Duncan	750,000	...	219	874
Stonewall Elec. Co., Tucson	100,000‡	...	116†	200†
San Carlos Irrig. & Drainage Dist., Coolidge	142,286‡	...	117†	331†
CALIFORNIA	**$12,132,178**	**$ 750,000**	**2,707**	**23,626**
Imperial Irrig. Dist., Imperial	700,000	...	780†	4,080†
Surprise Valley Electrification Corp., Alturas	2,391,500	...	872	1,812
Plumas-Sierra Rural Elec. Co-op., Portola	1,492,000	...	466	1,099
Mountain Empire Elec. Co-op., Campo	822,000	...	212	1,180
Sacramento MUD, Sacramento	5,325,000	...	374†	15,375†
Inter Valley Elec. Co-op., Inyokern	540,000	...	*	*
Mesa Elec. Co-op., Phelan	67,829‡	...	*	*
Klamath River Elec. Co-op., Hornbrook	43,849‡	...	3†	80†
Anza Elec. Co-op., Anza	750,000	750,000	*	*
COLORADO	**$56,312,536**	**$6,976,560**	**24,413**	**56,893**
Grand Valley Rural Power Lines, Grand Junction	1,544,000	...	680	2,924
San Luis Valley Rural Elec. Co-op., Monte Vista	3,284,000	490,000	1,141	2,363
Morgan County Rural Elec. Assn., Fort Morgan	3,896,000	1,295,000	1,270†	3,204†
Intermountain Rural Elec. Assn., Littleton	3,969,500	68,500	1,915	4,898
Southeast Colorado Power Assn., La Junta	8,532,810	2,275,000	3,687	5,630
Gunnison County Elec. Assn., Crested Butte	335,000	...	209	475
Delta Montrose Rural Power Lines Assn., Delta	1,294,000	...	745†	2,069†
Union Rural Elec. Assn., Brighton	1,802,000	...	831†	2,774†
San Isabel Elec. Assn., Pueblo	1,070,000	...	518	1,162
San Miguel Power Assn., Nucla	721,000	...	310	1,221
Highline Elec. Assn., Holyoke	3,733,477	700,000	2,260	3,725
Poudre Valley Rural Elec. Assn., Fort Collins	2,353,000	690,000	1,071	3,161
LaPlata Elec. Assn., Durango	1,800,000	430,000	619	1,772
Empire Elec. Assn., Cortez	1,605,448	...	679	3,420
Holy Cross Elec. Assn., Glenwood Springs	925,000	...	450	1,326
Sangre De Cristo Elec. Assn, Salida	1,222,000	...	441	1,004
Yampa Valley Elec. Assn., Steamboat Springs	3,896,000	...	756†	3,652†
Mountain View Elec. Assn., Limon	4,470,500	533,500	2,763	3,920
Y-W Elec. Assn., Akron	3,380,000	...	2,009	3,381
K.C. Elec Assn., Hugo	3,985,000	...	1,500	3,179
White River Elec. Assn., Meeker	1,520,060	631,560	192	821
Monument Elec. Co., Trinidad	128,741	...	81	309
North Park Rural Elec. Assn., Walden	845,000	...	286	503
IDAHO	**$15,000,295**	**$1,255,000**	**5,755**	**14,351**
Northern Lights, Sandpoint	2,939,750	670,000	1,085	3,225
Clearwater Valley L&P Assn., Lewiston	3,663,000	...	1,818†	4,069†
Kootenai Rural Elec., Coeur d'Alene	1,211,000	150,000	689	2,005
Idaho County L&P Co-op. Assn., Grangeville	973,500	...	584†	1,126†
Raft River Rural Elec. Co-op., Malta	1,076,000	...	419	630
Fall River Rural Elec. Co-op., Ashton	1,435,000	...	539†	1,510†
Lost River Elec. Co-op., Mackay	1,732,000	...	230	895
Prairie Power Co-op., Fairfield	424,000	...	223	221
Salmon River Elec. Co-op., Challis	1,350,000	435,000	3†	250†
Long Valley Power Co-op., Donnelly	196,045‡	...	165†	420†
MONTANA	**$38,948,697**	**$1,745,000**	**20,938**	**33,120**
Ravalli County Elec. Co-op., Corvallis	676,700	...	355	998
Sun River Elec. Co-op., Fairfield	2,004,500	...	1,699†	2,266†
Lower Yellowstone Rural Elec. Assn., Sidney	1,476,600	...	858	1,298
Yellowstone Valley Elec. Co-op., Huntley	1,405,498	...	906	2,226
Vigilante Elec. Co-op., Dillon	2,233,000	...	1,122†	1,825†
Missoula Elec. Co-op., Missoula	1,135,000	...	443	873
Flathead Elec. Co-op., Kalispell	1,965,000	...	580†	1,784†
Fergus Elec. Co-op., Lewistown	2,728,000	...	1,825	2,380
Park Elec. Co-op., Livingston	1,000,000	...	648	1,156
Mid-Yellowstone Elec. Co-op., Hysham	560,000	...	343	658
Beartooth Elec. Co-op., Red Lodge	1,292,000	...	953	1,627
Big Horn County Elec. Co-op., Lodge Grass	1,587,000	380,000	697	1,249
Big Flat Elec. Co-op., Turner	1,319,000	...	508	451
Sheridan County Elec. Co-op., Medicine Lake	2,640,000	...	1,721	1,892
Northern Elec. Co-op., Opheim	1,810,000	270,000	933	1,041
Valley County Elec. Co-op., Glasgow	935,000	...	520†	688†
McCone County Elec. Co-op., Circle	2,632,399	...	1,475†	2,126†
Goldenwest Elec. Co-op., Wibaux	1,139,000	...	723	722
Glacier County Elec. Co-op., Cut Bank	1,706,000	...	639	2,329
Marias River Elec. Co-op., Shelby	1,911,000	...	830	2,246
Hill County Elec. Co-op., Havre	2,685,000	...	2,126	1,592
Tongue River Elec. Co-op., Terry	1,578,000	...	464†	450†
Southeast Elec. Co-op., Ekalaka	1,200,000	700,000	304	541
Lincoln Elec. Co-op., Eureka	1,110,000	395,000	217	512
Elmo Elec. Co-op. Assn., Polson	220,000	...	49†	190†
NEVADA	**$ 354,000**	...	**165**	**737**
Alamo Power Dist. No. 3, Alamo	99,000	...	36	91
Overton Power Dist. No. 5, Overton	255,000	...	129	646

Borrower	Cumulative Construction Loans 12-31-52	1952 Construction Loans**	Miles Energized 12-1-52	Consumers Connected 12-1-52
NEW MEXICO	**$58,092,413**	**$17,203,440**	**15,782**	**37,988**
Central Valley Elec. Co-op., Artesia	3,801,000	485,000	807	2,528
Roosevelt County Elec. Co-op., Portales	2,512,000	...	1,179	2,530
Farmers' Elec. Co-op., Clovis	3,536,000	...	2,193	3,879
Kit Carson Elec. Co-op., Taos	2,572,215	(31,560)	678	4,064
Otero County Elec. Co-op., Cloudcroft	2,421,000	665,000	604†	1,553
Stonewall Elec. Co., Albuquerque	134,498‡	...	119†	489†
Mora-San Miguel Elec. Co-op., Mora	1,483,000	320,000	592	1,613
Northern Rio Arriba Elec. Co-op., Chama	1,005,000	160,000	243†	867
Sierra Elec. Co-op., Truth or Consequences	598,000	...	239	463
Springer Elec. Co-op., Springer	3,097,000	95,000	1,166	2,020
The Socorro Elec. Co-op., Socorro	3,429,400	985,000	1,117	2,562
Central New Mexico Elec. Co-op., Corona	4,111,500	...	2,207	2,897
Continental Divide Elec. Co-op., Grants	3,210,000	585,000	695†	2,329
Lea County Elec. Co-op., Lovington	9,256,800	4,895,000	1,089†	3,453†
Columbus Elec. Co-op., Columbus	1,990,000	...	896	647
Southwestern Elec. Co-op., Clayton	1,410,000	...	1,117	822
Jemez Mountains Elec. Co-op., Espanola	4,480,000	...	841	5,272
Plains Elec. (Generation and Transmission) Co-op., Springer	9,045,000	9,045,000	*	*
OREGON	**$30,431,958**	**$3,403,604**	**7,820**	**28,264**
Blachly-Lane County Co-op. Elec. Assn., Blachly	1,102,000	...	265	1,183
Benton-Lincoln Elec. Co-op., Corvallis	5,540,000	1,710,000	1,301	4,610
Umatilla Elec. Co-op. Assn., Hermiston	1,173,000	...	378	1,951
Douglas Elec. Co-op., Roseburg	2,505,674	256,174	738	3,394
Lane County Elec. Co-op., Eugene	2,782,426	118,826	665	4,546
Coos Elec. Co-op., Coquille	4,192,604	1,318,604	679†	4,025†
Northeast Clackamas County Elec., Co-op., Sandy	1,064,000	...	212†	760†
Tillamook PUD, Tillamook	425,000	...	75	398
Central Elec. Co-op., Redmond	*1,776,000	...	712	1,652
Wasco Elec. Co-op., The Dalles	2,061,000	...	1,068†	1,475†
Columbia Basin Elec. Co-op., Heppner	1,665,000	...	759	677
West Oregon Elec. Co-op., Vernonia	1,884,000	...	433	2,158
Eastern Oregon Elec. Co-op. Assn., Pendleton	795,000	...	150	405
Columbia Power Co-op. Assn., Spray	2,230,000	...	9†	155†
Malheur Co-op. Elec. Assn., Vale	463,670‡	...	365†	621†
Jordan Valley Elec. Co-op., Jordan Valley	27,584‡	...	4†	91†
Midstate Elec. Co-op., Lapine	745,000	...	7	163
UTAH	**$14,576,107**	**$ 415,607**	**1,395**	**4,208**
Garkane Power Assn. Inc., Richfield	1,189,500	...	516†	1,579†
Moon Lake Elec. Assn. Inc., Mt. Emmons	3,827,000	425,000	706†	2,251†
Beaver Valley Elec. Assn., Beaver City	14,607	(9,393)	13†	45†
Escalante Valley Elec. Assn. Inc., Beryl	825,000	...	100	238
Flowell Elec. Assn. Inc., Fillmore	34,000	...	30†	63†
Dixie Rural Elec. Assn., St. George	501,000	...	30†	32†
Southwest Utah Power Fed., Cedar City	7,885,000	...	*	*
Utah-Arizona Elec. Assn., Kanab	300,000	...	*	*
WASHINGTON	**$33,176,475**	**$4,721,596**	**12,637**	**31,365**
Benton Rural Elec. Assn., Prosser	3,894,500	1,500,000	1,055	3,151
Orcas P&L Co., Eastsound	1,807,600	(9,400)	300†	1,408†
Mutual P&L Assn., North Bend	146,919	80,000	30†	81†
PUD No. 1 of Klickitat County, Goldendale	2,805,000	440,000	873†	1,969†
Inland Empire Rural Electrif. Inc., Spokane	4,008,280	...	2,888	5,412
Columbia County Rural Elec. Assn. Inc., Dayton	1,372,000	...	745	965
Quinault Light Co., Quinault	763,000	...	34†	276†
PUD No. 1, Chehalis	467,752‡	...	330†	1,817†
PUD No. 1 of Kittitas County, Ellensburg	443,000	...	233	515
Stevens County Elec. Co-op. Inc., Colville	2,243,996‡	(704,004)	1,060†	2,280†
Chelan County Elec. Co-op. Inc., Leavenworth	231,000	...	94†	391†
Okanogan County Elec. Co-op. Inc., Winthrop	225,000	...	135	434
Pend Oreille Elec. Co-op. Inc., Newport	1,511,000	550,000	614†	1,012
Big Bend Elec. Co-op. Inc., Ritzville	3,407,000	1,260,000	1,157†	1,180†
Lincoln Elec. Co-op. Inc., Davenport	1,642,000	135,000	1,136	1,080
Nespelem Valley Elec. Co-op. Inc., Nespelem	521,000	...	227†	545†
Molson-Chesaw Elec. Co-op., Molson	315,000	...	127†	165†
PUD No. 1 of Clallam County, Sequim	1,166,000	...	75	928
Ferry County PUD No. 1, Republic	1,375,000	445,000	367	1,014
PUD No. 1 of Douglas County, Bridgeport	4,197,000	1,025,000	841†	4,612†
Mason County PUD No. 1, Shelton	170,000	...	48†	209†
PUD No. 1 of Pend Oreille County, Newport	213,956‡	...	59†	498†
PUD No. 1 of Cowlitz County, Longview	201,192‡	...	185†	680†
PUD No. 2 of Grant County, Ephrata	49,280‡	...	24†	743†
WYOMING	**$25,200,707**	**$4,309,400**	**10,937**	**17,048**
Riverton Valley Elec. Assn., Riverton	1,575,000	...	873	1,517
Big Horn Rural Elec. Co., Basin	1,383,000	...	687	1,438
Wyrulec Co., Lingle	1,859,600	...	1,061	1,885
Bridger Valley Elec. Assn., Mountain View	1,157,801	...	317	766
Lower Valley P&L, Freedom	4,206,006	2,709,400	343	1,286
Wheatland Rural Electrif. Assn., Wheatland	921,000	...	713	913
Garland L&P Co., Powell	375,300	...	197	482
Washakie Rural Elec. Co., Worland	172,500	...	96	238
Rural Elec. Co., Pine Bluffs	3,057,000	270,000	1,900†	2,702
Hot Springs County Rural Elec. Assn., Thermopolis	1,240,000	...	615	683
Carbon P&L, Saratoga	1,057,054	...	610	1,177
Niobrara Elec. Assn., Lusk	2,376,000	...	1,045†	1,029†
Shoshone River Power, Cody	1,365,000	950,000	302	325
Sheridan-Johnson Rural Elec. Assn.	1,485,000	...	642	745
Tri-County Rural Elec. Assn., Sundance	2,891,746	380,000	1,371	1,634
Sheridan Suburban Elec. Co., Sheridan	78,700‡	...	165†	228†

**Net increase or decrease during year. Reflects rescissions of loans made in prior years. Parentheses indicate decrease.

*Not energized.

†Estimate.

‡Loan repaid.

tinually increasing system demands. It is estimated that an additional $4,000,000 will be spent in 1953 for system betterments.

In August 1952 unit No. 2, having a capacity of 30,000 kw, was placed in service at El Centro steam station. This brings the total capacity of this plant to 50,000 kw of name-plate rating.

In July 1952 construction started on the All-American Canal Drop No. 2 hydro plant. This will be a two-unit plant with a total capacity of 10,000 kw, with Kaplan-type turbines. The plant is presently scheduled to be in service by August 1953. It will be operated under supervisory control from the Drop No. 4 plant, 10 miles distant, and will utilize canal flow irrigation water varying from 2,000 to 5,500 cfs.

Twenty-five miles of 161-kv transmission line, extending from the Drop No. 4 termination of Bureau of Reclamation's transmission tie to El Centro switching station, were completed and placed in operation in February 1952.

During the past year the district exercised its option for purchase of the major portion of California Electric Power Co.'s 88-kv transmission line between Calipatria and Blythe. During 1953 it is planned to reconstruct this line for 161-kv operation, with terminal points relocated to Niland and the USBR substation at Blythe.

Distribution plant was increased during the past year by an estimated 40 miles of new 12-kv and 4-kv lines, and approximately 14,000 kva in pole-type distribution transformer capacity were added.

Continued system growth of demand is indicated by the addition of 1,800 new meters during 1952. This year's peak reached 72,300 kw in October, representing an increase of 21.5% over the 59,500-kw peak of 1951.—*E. A. Weiss, executive engineer.*

Los Angeles Dept. of W&P

Construction expenditures during 1952 by the power system of the department for new and improved plant facilities were approximately $24,377,000. The program for 1953 provides for new construction and additions and betterments to existing plant of approximately $43,255,000. The figures for both years exclude amounts for purchase of land.

No new steam generating capacity was added during the year. Two of the Owens River Gorge hydroelectric plants were placed in operation, adding 75,000 kw of generating capacity to the department's system. Power

from this source is brought in over the 260-mile 230-kv transmission line, which was completed during the previous year.

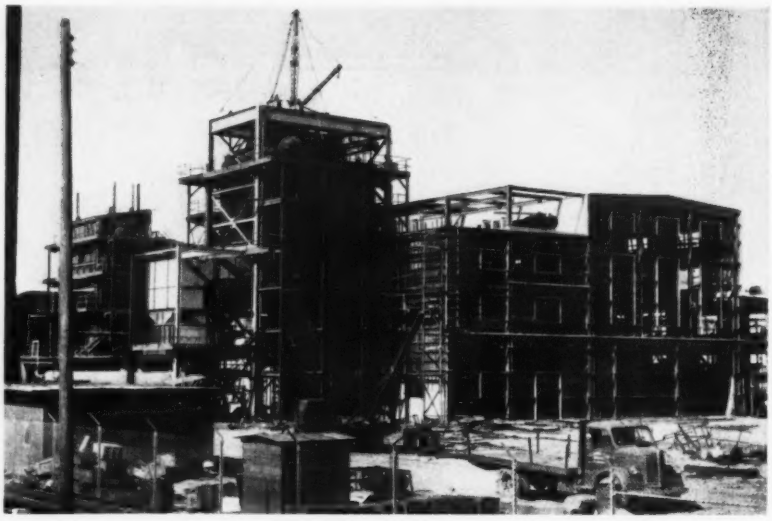
Transmission lines completed included 7.6 miles of 230-kv double-circuit and 12 miles of 230-kv single-circuit lines, both ACSR of 954,000 CM for connections to receiving stations. New receiving station J was placed in initial service, with a 37,500-kva 115/34.5-kv transformer bank moved from station E. This new receiving station will relieve overload conditions brought on by the greatly accelerated load growth caused by heavy residential building in the West San Fernando Valley area. A 50,000-kva 132/34.5-kv transformer bank was moved from its position on the Edison tie at receiving station E and installed temporarily at receiving station D to handle increased load in that area.

Seven new distributing stations were completed during the year. These new stations, together with the bank changes in existing stations, account for a net gain of 137,250 kva in transformer capacity. Distribution lines added included: 9.3 miles of 34.5-kv overhead; 1.4 miles of 34.5-kv underground; 95 miles of 4.8-kv overhead, and 8.5 miles of 4.8-kv underground. The 1952 system peak was 988,000 kw, and occurred on Dec. 1.

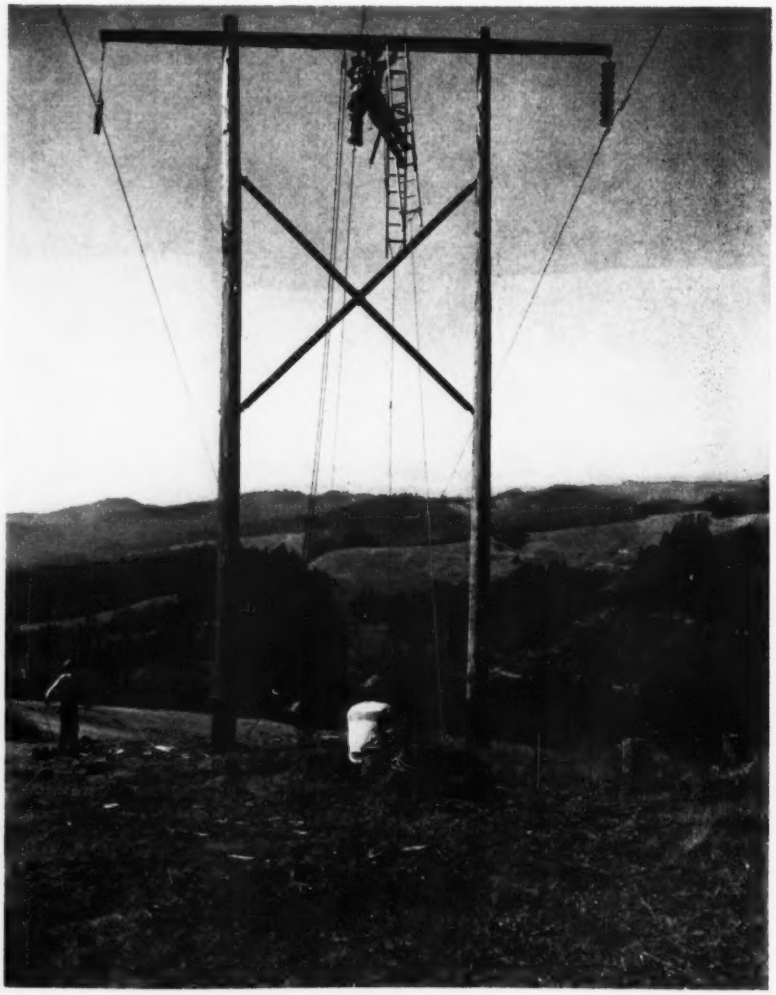
The third Owens River Gorge power plant is scheduled to go in operation in the spring of 1953. This plant will add 37,500 kw of capacity, which, together with the two similar plants which were placed in service during 1952, will make available the full 112,500 kw of generating capacity from this project. The first 100,000-kw unit of the new Valley steam plant is scheduled to go in service late in the year.

Transmission lines to be constructed will consist of four sections, aggregating 19 miles of 138-kv double-circuit overhead and three miles of 115-kv single-circuit overhead, the latter being carried on three circuit towers also carrying two 138-kv circuits. These lines will interconnect new and existing receiving stations and the Valley steam plant now under construction. A 3.4-circuit-mile extension of 138-kv underground cable will provide a 138-kv cable circuit to new receiving station H.

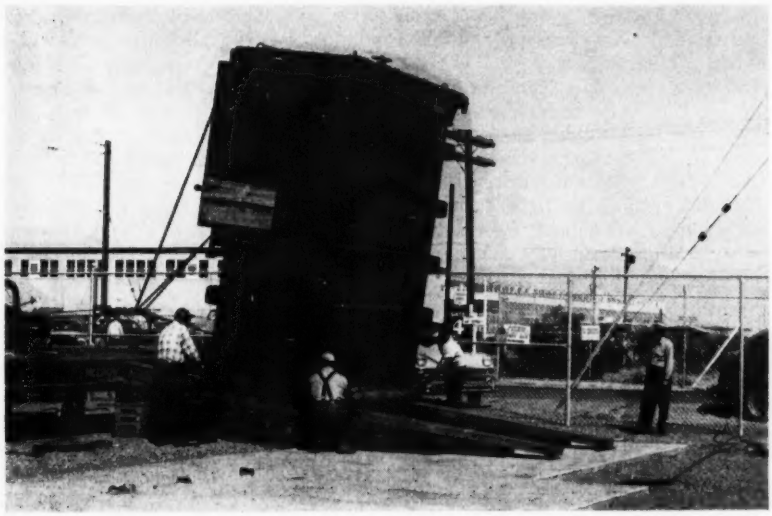
Two new receiving stations, G and H, are scheduled to go into operation, with two transformer banks each. A transformer bank will be transferred from receiving station E to receiving station J, and a new transformer bank will be installed at receiving station E. Two 100,000-kva, three-phase, 230/138-kv autotransformers will be in-



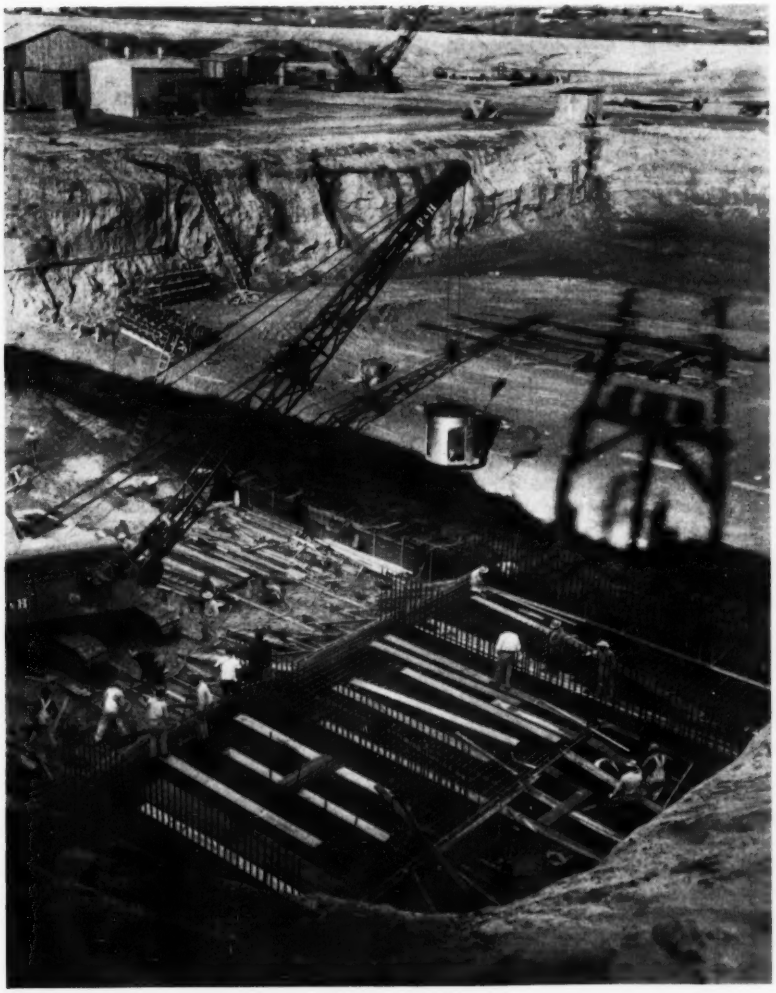
Unit No. 2 was completed in the El Centro steam plant of Imperial Irrigation District. Planned for this year is a 10,000-kw hydro unit at Drop 2 on the All-American Canal



Stringing conductor on the Shasta-Humboldt 110-kv line of Pacific Gas and Electric Co.



Network substation unit for 1953 installation by Sacramento Municipal Utility District is part of this year's $163,000 program for extension of downtown underground network



Foundation work on new 400,000-kw Encina steam plant of San Diego Gas & Electric

stalled at receiving station B to interconnect the department system with the 220-kv system of the Southern California Edison Co. This totals to a net addition of 500,000 kva of transformer capacity at receiving stations.

Four new distributing stations are scheduled for completion. The bank changes planned in the existing distributing stations plus the transformer capacity added in the new stations will result in a net gain of 99,500 kva. New distribution lines in the program include: overhead, 20 miles of 34.5 kv and 100 miles of 4.8 kv; underground, 20 miles of 34.5 kv and 18 miles of 4.8 kv. As presently estimated, the 1953 system generation peak will approximate 1,075,000 kw.—*William S. Peterson, chief electrical engineer and assistant manager.*

Modesto Irrigation District

Capital expenditures for 1952 were approximately $265,000 and are anticipated to be $320,000 in 1953. There were no major plant additions during 1952.

No major construction is anticipated for 1953. System facilities are now adequate to meet normal anticipated demands for the coming year. The only minor construction planned is the addition of small distribution substations as load requires. More work is expected to be done on our underground distribution system in order to convert services from the overhead system to the underground system.

During the year, approximately six miles of 12- and 4-kv distribution lines were added to our system.—*C. E. Plummer, chief engineer.*

Pacific Gas and Electric

The three million kilowatt mark was surpassed near the end of July 1952 by Pacific Gas and Electric Co., when a new high peak load of 3,074,900 kw was recorded. This is a 6.4% increase over last year's peak of 2,890,800 kw, which occurred in August.

During its sustained postwar power and gas construction program, the company has expended approximately $975,000,000 from the beginning of 1946 through 1952, and it is expected that the $1 billion mark will be reached early this year. For electrical facilities only, approximately $140,000,000 were expended in 1952, as compared to $108,000,000 in 1951. It is expected that at least as much will be spent in 1953 as was expended in 1952.

Units Nos. 4 and 5 at the company's Moss Landing steam plant were placed

in operation during October and December, respectively, of 1952. This addition of 235,000 kw of steam-electric capacity (gross normal operating) raises the total station capacity for the five units to 575,000 kw. Two similar units, also Units Nos. 4 and 5 and totaling 235,000 kw, are planned to be in service by the early summer of 1953 at Contra Costa steam plant, the company's other 575,000-kw steam plant. The cost of the five-unit installations at Moss Landing and Contra Costa has been estimated at approximately $80,000,000 each. Construction of the 600,000-kw, four-unit Pittsburg steam plant was started in November 1951. This outdoor installation is now scheduled for operation in the spring of 1954, and will cost about $75,000,000.

The construction of two new steam stations has been announced by the company, currently scheduled for operation by the summer and autumn of 1955, respectively. One will be a two-unit, 300,000-kw plant to be constructed at an as yet undetermined location. The other will be a 50,000-kw unit at Buhne Point, near Eureka. The costs of these stations are estimated at $44,300,000 and $9,600,000, respectively.

The close of 1952 witnessed the completion, except for accumulation of water in storage, of the company's Bear River project, which included the installation of a 33,000-kva (29,000-kw) generating unit at the existing Salt Springs power house. The estimated cost of this project is $11,000,000. New hydroelectric construction announced during the past year consists of the replacement of Murphy's power house, which was constructed by the former Utica Power Co. at the turn of the century, and the construction of the Pit No. 4 project. The new Murphy's plant will be located about 3,000 ft downstream from the existing site, on Angels Creek. The new plant, like the old, will utilize water from the North Fork of the Stanislaus River and from Beaver Creek via the Utica Ditch. The new installation will include two earth dams creating a forebay and an afterbay, a part wood stave and part welded steel penstock about 4,100 ft long, and a 4,500-kva (3,800-kw) generator driven by a 5,300-hp, vertical-shaft, six-jet-impulse water wheel. The plant is scheduled for operation during the autumn of this year and is estimated to cost $1,335,000. The Pit No. 4 project will be the company's sixth such hydro station on the Pit River system, the existing plants being Pit Nos. 1, 3, and 5 and Hat Creek Nos. 1 and 2. The salient features of this development include a pressure tunnel approximately 21,500 ft long, fully lined, from the existing Pit No. 4 intake to a point in the Pit River Canyon above the proposed Pit No. 4 power house; a surge chamber; two penstocks approximately 12 ft in diameter and about 800 ft long from the end of the tunnel to Pit No. 4 power house; and two 50,000-kva (42,000-kw) generators, each driven by a 58,000-hp, Francis-type vertical turbine. The plant is scheduled for operation by the summer of 1955, and is expected to cost approximately $25,200,000.

During the past year approximately 772,500 kva of transmission substation transformer capacity were installed, including 262,500 kva of step-up capacity at generating stations. The comparable estimate for 1953 is 1,117,100 kva, of which 267,000 kva will be step-up capacity. Except for the step-up transformers, these figures represent both 230/115 kv and 115/60 kv autotransformer capacity.

Some 440 line miles of transmission lines were constructed during 1952, and approximately 455 line miles are planned for construction in 1953.

Numerous distribution substations, totaling approximately 571,000 kva of transformer capacity, were constructed during the past year, and about 396,000 kva of capacity are estimated to be installed this year. These capacities involve secondary voltages under 50 kv and primary voltages up to and including 115 kv. Distribution lines constructed, including line extensions, amounted to 1,800 line miles in 1952, with an estimated 1,600 line miles in view for 1953. The company's electric customers numbered approximately 1,460,000 at the close of 1952, an increase of some 58,000 over the previous year.—*Walter Dreyer, vice-president and chief engineer.*

Pasadena L&P Dept.

During the fiscal year 1951-1952 energy sold in Pasadena exceeded the previous year by 8.2%. Total revenues increased 8.3% and operating expense 9.1%. Additions to capital amounted to $1,253,234. Distribution transformers and service increased from 82,714 kva to 88,102 kva or 6.5%. The number of meters increased from 42,542 to 44,061 or 3.6%.

Construction work included primarily completion of a new 20,000-kva 4,160-v distribution substation and a new dispatching and control building which is ready for occupancy.

Plans are nearing completion for the new 80,000-kw generating station. The first 40,000-kw unit is now scheduled for completion in January 1954 and a similar unit in 1956. We estimate that peak demand and load will continue to increase at the rate of approximately 10% during the next year or two.—*E. H. Bettannier, general manager and chief engineer.*

Riverside PU Dept.

The year 1952 showed an expenditure for the construction of plant improvements and additions of approximately $225,000. This was about half the expenditure for the year 1951, which included the purchase and erection of two unit-type, 4,600-kva sub-

REA Operations — Eleven Western States — 1952

State	Cumulative Construction Loans	1952 Loan Approvals Amount	Estimated Miles	Estimated Consumers	Energized Systems To Dec. 1, 1952 Miles	To Dec. 1, 1952 Consumers	To Dec. 31, 1951 Miles	To Dec. 31, 1951 Consumers
Arizona	$ 16,057,906	$ 940,000	57	...	3,236	10,752	2,869	9,909
California	12,132,178	750,000	230	403	2,707	23,626	2,695	19,560
Colorado	56,312,536	6,976,560	2,362	2,303	24,413	56,893	20,189	49,427
Idaho	15,000,295	1,255,000	274	539	5,755	14,351	5,550	13,069
Montana	38,948,697	1,745,000	688	1,007	20,938	33,120	18,254	29,954
Nevada	354,000	...	...	...	165	737	165	729
New Mexico	58,092,413	17,203,440	1,897	3,916	15,782	37,988	11,044	32,503
Oregon	30,431,958	3,403,604	114	2,485	7,820	28,264	7,469	25,324
Utah	14,576,107	415,607	27	89	1,395	4,208	1,316	3,929
Washington	33,176,475	4,721,596	1,083	2,654	12,637	31,365	12,308	29,466
Wyoming	25,200,707	4,309,400	841	2,324	10,937	17,048	9,746	15,274
Totals	**$300,283,272**	**$41,720,207**	**7,573**	**15,720**	**105,785**	**258,352**	**91,605**	**229,144**

Farm Electrification by States

State	Total Farms April 1, 1950*	No. Farms Electrified July 1, 1952	Unelectrified Farms July 1, 1952	Per Cent Electrified Farms
Arizona	10,412	9,163	1,249	88.0
California	137,168	128,960	8,208	94.0
Colorado	45,578	38,787	6,791	85.1
Idaho	40,284	38,487	1,797	95.5
Montana	35,085	27,672	7,413	78.9
Nevada	3,110	2,022	1,088	65.0
New Mexico	23,599	15,693	7,906	66.5
Oregon	59,827	56,384	3,443	94.2
Utah	24,176	22,484	1,692	93.0
Washington	69,820	67,374	2,446	96.5
Wyoming	12,614	10,713	1,901	84.9
Totals	**461,673**	**417,739**	**43,934**	**90.5**

* Preliminary 1950 U.S. Census of Agriculture

stations. An amount of approximately $325,000 is expected to be spent during the year 1953. This will include the purchase and erection of a new double-ended, 4,600-kva addition to our Industrial substation, which has been made necessary by load growth in the industrial area of the city of Riverside. The connection of some 1,273 new services has made it necessary to construct 19.8 miles of distribution circuits.

Several installations of mercury-vapor street lights have been completed, and a job is now under way to interconnect and synchronize traffic signals on the two state highways passing through the main portion of the city. The Department of Public Utilities is cooperating with the California State Division of Highways in this endeavor.

The California State School for the Deaf, which is to be served by an underground loop consisting of five unit-type substations having a capacity of 1,350 kva, is expected to be connected to the system early in 1953.

The energy purchased during 1952 has risen almost 25% above 1951 to approximately 100,000,000 kwh. Since the kva capacity of the distribution transformers connected to the system has increased only 12% and transformer overload problems have been kept to a minimum, this indicates a much better utilization of equipment. An additional motor load of 3,117 hp was connected to the system during 1952, along with 749 electric ranges and 141 water heaters.

Here in southern California the citrus industry uses the wind machine quite extensively for frost protection. The machine consists of an electric motor-driven propeller mounted on a tower some 30 ft in height. The principle of these machines is to create artificial temperature inversion thus raising the temperature near the ground. Twenty-nine such machines have been connected this year with a total load of 2,500 hp, which is an increase of 58% in the total wind machine load on the system.

In conjunction with the building of a civil defense organization in southern California, personnel and procedures have been discussed and decided upon to cope with the utilities' problems in the event of an emergency.—*Jack R. Shepard, engineering supervisor.*

Sacramento MUD

The year 1952 marked the completion of six full years of operation of the district. During this sixth year, the system peak demand reached a high of 140,000 kw, slightly more than double the original peak recorded in 1947. Consumers served at the end of 1952 approximated 104,300, and energy consumed reached an annual average of 5,900 kwh per customer.

Construction activity continued at a rapid pace, approximately $3,200,000 being expended for new plant. Included in these plant additions were approximately 17 miles of subtransmission line (60 kv and 23 kv), nine unit substations totaling 19,500 kva and approximately 74 miles of primary distribution line (12 kv and 4 kv). In addition, several large transformers were installed to serve industrial consumers, one of which was a 5,000-kva, 23/12-kv, three-phase unit to supply the new Proctor and Gamble plant nearing completion. Included in the new subtransmission was a two-mile underground circuit of 23 kv, 500 MCM, PILC low-pressure gas-filled cable installed between City substation (a 100/23-kv bulk supply point) and station D. The program of 23 kv to 60 kv conversion and 4 kv to 12 kv conversion was continued in the rural areas working toward a well-integrated 60/12-kv distribution system incorporating modern unit-type substation equipment.

During the early part of the year, a new 48,000-sq-ft warehouse and service center was completed and placed in operation. All purchases and stores functions and most of the operating department functions are carried on in this building.

The 1953 budget includes $3,800,000 for a continuation of plant construction at an even more accelerated pace than in the past. Overhead plant additions will include approximately 12 miles of new and/or converted 60 kv, 3 miles of 23 kv, 13 unit substations totaling 31,500 kva and 80 miles of 4-kv and 12-kv distribution lines. All of the unit substations will be 2,000- and 3,000-kva single-circuit units with one exception. This unit will be the first section of an ultimate double-ended 10,000/12,500-kva, 60/12-kv multicircuit spot network unit installed primarily for the purpose of establishing a new 12-kv supply to the McClellan Air Force Base.

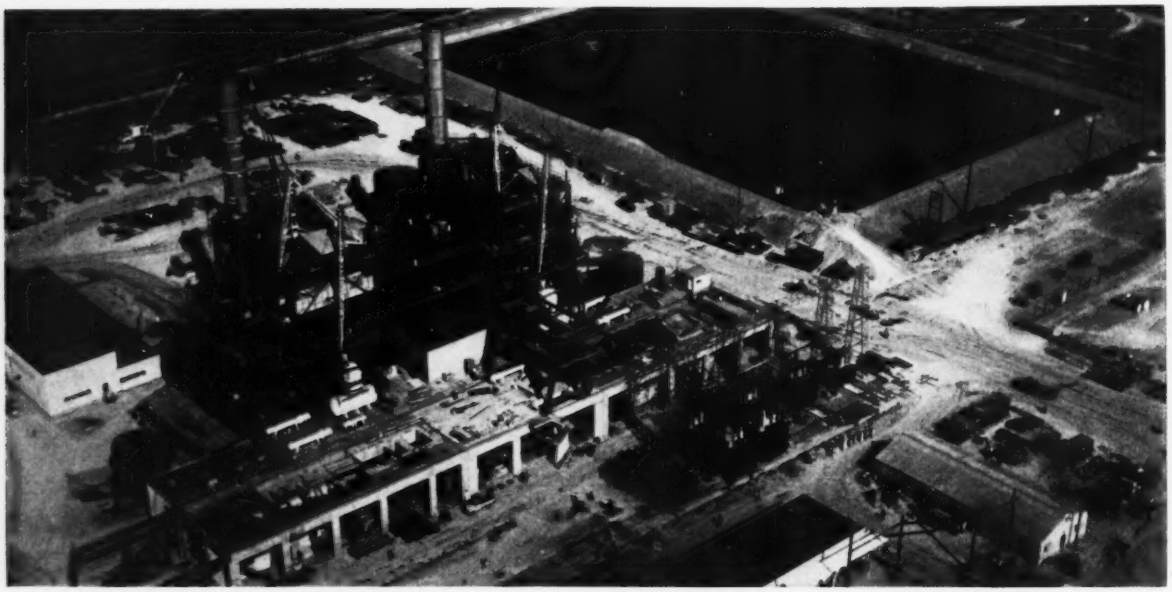
Underground plant additions will include two additional 23-kv gas-filled cable circuits each approximately 1½ miles long to supply distribution substation loads in the overhead areas surrounding the downtown section. In the downtown section major load additions will continue to be served from the expanding 12-kv-fed secondary network. In this regard it is planned to install about 15 standard 12,000-216 Y/125-v network transformers during 1953.—*C. R. Day, electrical engineer.*

San Diego G&E

Peak load in 1952 reached a record high of 339,000 kw, which was 35,500 kw more than the 303,500-kw 1951 peak. In 1952 an estimated 13,000 new electric meters were added, bringing the total served to approximately 211,000.

During 1952 the company spent more than $12,000,000 on the expansion of its electric facilities. Of that amount $4,300,000 were spent on the completion of the 50,000-kw unit No. 4 turbogenerator at the Silver Gate plant. An additional $1,500,000 was expended on construction at the new Encina plant at Carlsbad. Almost $6,000,000 were devoted to the strengthening of transmission and distribution facilities. Major additions to the system included the following 69/12-kv substations: Monserate, Jamacha, Murray, Point Loma, Poway and Vista. The new 12/4-kv Bostonia, Carlsbad, Morena, Point Loma and Serra substations were also added. Furthermore, the capacities of the 12/4-kv substations at Chula Vista, Encanto, Pacific Beach, San Clemente and Vista were appreciably increased. Of the $6,000,000, several millions were spent on customer extensions and general improvement of service.

For 1953 the capital expenditure



Air view of Etiwanda outdoor steam plant of Southern California Edison Co. First 100,000-kw unit is scheduled for March of this year

budget is set at $13,350,000. About $5,000,000 of this will be spent for further construction at the Encina plant. More than $7,000,000 are earmarked for expansion of transmission and distribution facilities. This includes the building of the 69/12-kv San Mateo and Rincon substations and the 12/4-kv Witherby, Fairmount, Reynard and Jamacha substations. More than $2,500,000 of the seven million dollars will be spent for new customer extensions and improvement of service. Further, $950,000 will be spent in the construction of the company's new El Cajon operating headquarters, an automotive repair shop and installation of a microwave system.—*H. A. Noble, vice-president in charge of operation.*

Southern California Edison

Approximately $70,000,000 were expended during the year 1952 for plant additions to generation, substation, transmission lines, distribution lines and other system betterments. The budgeted amount for the calendar year 1953 is approximately $73,500,000 for like system additions and betterments.

During the year, 725.3 line miles of distribution circuits were placed in service and 118.4 line miles of transmission circuits were constructed. Five new distribution substations were constructed with a capacity of 33,250 kva and one new transmission substation was placed in service with a capacity of 180,000 kva. Transformer capacity of 162,550 kva was added to existing distribution substations and 188,500 kva added to existing transmission substations. Approximately 58,500 new meters and 730,000 hp of new load were connected to the system.

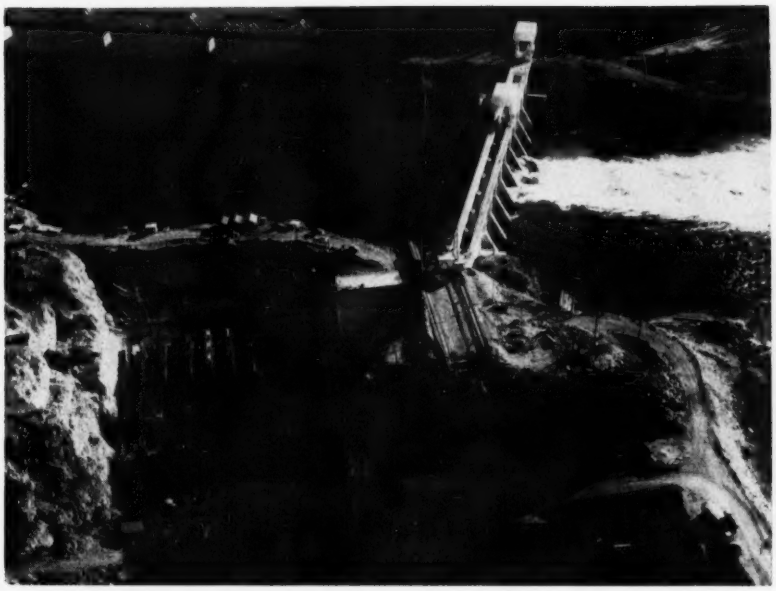
Construction of one new 220-kv transmission substation, known as Center substation, started in 1951 on a 52-acre site southeast of Downey, was completed and placed in service during the early part of 1952 at a cost of approximately $4,900,000. The initial installation consists of two 90,000-kva, 220/66-kv transformer banks, a condenser transformer bank, and one 60,000/72,000-kva synchronous condenser.

A new 220-kv interconnection between the systems of Pacific Gas and Electric Co. and Southern California Edison Co. was placed in service April 16, 1952. These facilities consist of a 250,000-kva, 220/200-kv bank of autotransformers installed at Edison's Magunden substation near Bakersfield and a 220-kv transmission line constructed between Magunden substation and a point adjacent to Pacific's Kern steam plant where Pacific extended its line from its Midway substation.

Construction work continued throughout the year on a new outdoor-type steam-electric generating station, started March 6, 1951. This station has been named Etiwanda steam station, and is located on a 207-acre site in the vicinity of Etiwanda, Calif. The initial installation consists of two outdoor-type 100,000/125,000-kw turbogenerators with their independent 920,000-lb-per-hour steam generator. The turbines are of the tandem-compound, triple-flow exhaust type for 1,800 psig at the throttle with 1,000° initial temperature and 1,000° reheat. The first unit is scheduled for operation in March 1953, and the second in June 1953. This station, including industrial waste and fuel supply lines, is expected to cost $37,400,000.

An agreement was entered into during 1951 for the installation of two 100,000-kva, three-phase, 220/138-kv autotransformers to provide a 200,000-kva interconnection between the electric systems of the Los Angeles Department of Water & Power and the Southern California Edison Co. While this interconnection was scheduled for operation in October 1952, shipment of the autotransformers was delayed and it now appears that the interconnection will be placed in operation in February 1953.

Construction was started in 1952 on a new steam-electric generating station known as Redondo steam plant No. 2 adjoining the present Redondo steam station in Redondo Beach. The new plant, which initially will have one 125,000/156,250-kw turbogenerator with a 1,140,000-lb-per-hour steam generator, is expected to cost approximately $24,400,000 and is scheduled for operation in June 1954. The turbine, like those for Etiwanda, is of the tandem-compound triple-flow exhaust type for 1,800 psig, 1,000° initial temperature with 1,000° reheat. A second similar unit, the cost of which is not included in the above amount, is



Albeni Falls Dam and 42,600-kw power plant being built on Columbia by Army Engineers

planned for service in the midyear of 1955.

Late in 1952, construction of one new 220-kv transmission substation, to be known as Antelope substation, was started on a site 10 miles west of Lancaster. The initial installation will consist of one 90,000-kva, 220/66-kv transformer bank. It is scheduled for completion in May 1953 and is estimated to cost approximately $2,100,000.

Six new distribution substations are planned for construction in 1953. The new transmission and distribution substations, together with additional transformer capacity at existing transmission and distribution substations, will require approximately 586,750 kva of new transformer capacity.

Plans are in progress to construct and complete 820 line miles of transmission and distribution circuits in 1953 and to connect approximately 55,000 new meters.—*W. N. Johnson, vice-president in charge of operation.*

Turlock Irrigation District

Turlock Irrigation District built 15 miles of 12-kv distribution line during 1952 and connected 900 new customers to its electrical system.

The system now comprises 1,023 miles of line and serves 16,000 customers. Load growth required the reinforcing of some lines and the further addition of capacitors and voltage regulators.

Total construction costs for the year amounted to $155,000.

Proposed construction for the coming year will be along the same trend plus the addition of a 7,500-kva substation in the northeast area. Construction budget has been set at $241,000. —*L. H. Parker, electrical engineer.*

Colorado

Colorado-Big Thompson Project, USBR

Current plans call for full use in 1953 of all major facilities on this transmountain diversion project in Colorado. Completed during 1952 were the 59-mile-long, 115-kv Salida-Gunnison transmission line and the 36-mile-long, 115-kv Flatiron-Fort Collins-Cheyenne tap line. The 9.5-mile-long, 115-kv Estes-Pole Hill line is about 85% completed.

Construction of the 33,250-kw Pole Hill power plant structure is essentially completed, and furnishing and installing the generator is under contract. The Flatiron power and pumping plant structure, 69,700 kw capacity, is about three-fourths completed; contracts are in force for furnishing and installing the plant's two 35,000-kva generators.

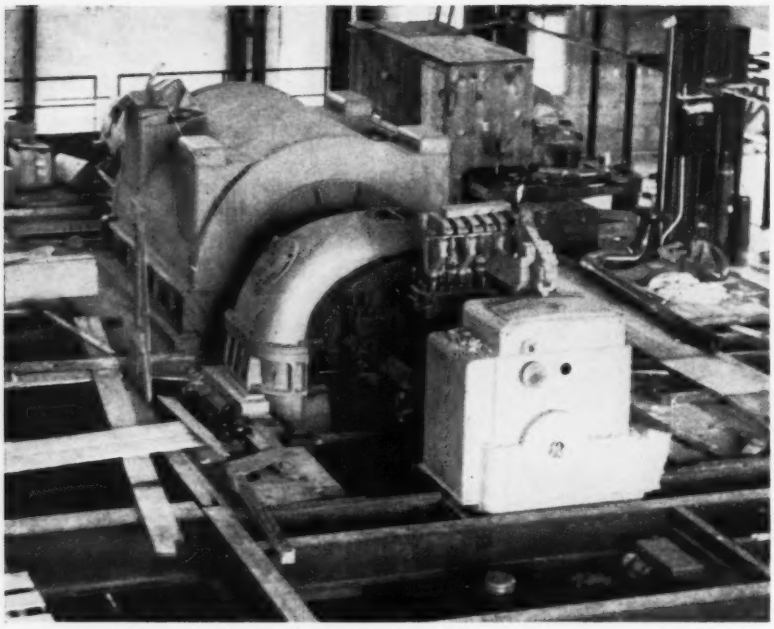
Colorado Central Power

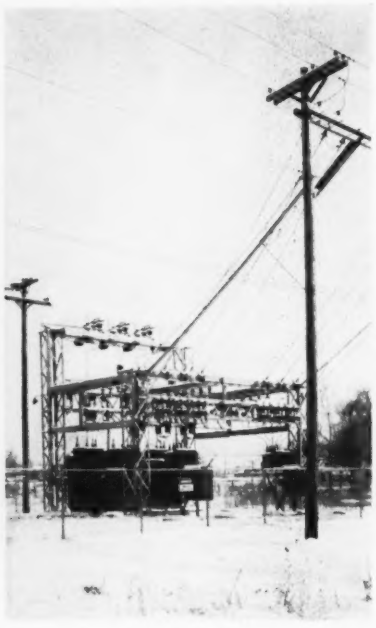
Growth in number of customers and gross kilowatt-hour sales followed very close to forecast figures. On a percentage basis these increases were: number of customers, 6%; kilowatt demand, 14%; kilowatt-hour sales, 16%. The company spent $1,050,000 for construction during 1952. The construction budget for 1953 is $1,000,000.

During the year of 1952 there were spent $500,000 for blanket construction. This portion of construction expense was for connecting new customers and routine replacements. We spent $450,000 for major construction items during the year. The balance of $100,000 was spent for additions and improvements to company buildings, transportation and miscellaneous capital improvements.

During 1952 we revamped our 13,000-v system in the Arapahoe district to take service from a new 115,000/13,200/7,620-v supply terminal. This was the largest item of expense for major construction during the year. The company continued its program during the year to convert fringe area distribution from 4,160 v to 13,200/7,620 v in both Arapahoe and Jefferson County districts. One end of a 4,000-kva duplex 13,200/4,160-v substation was put into service in Englewood late in the year with the second half to go into service in the next six months. A new 13,200/4,160-v substation was put into service in Golden in midyear. This station was designed for 2,500 kva but will have a 1,000-kva bank initially. A 750-kva, 13,200 delta to 13,200 wye substation was installed in the Pleasant View-Wide Acres area in the Jefferson County district to start a program to cut over this fast growing area from 4,160 to 13,200 v wye. A new 4/0, 13,200-v feeder was built from the town of Golden to the top of Lookout Mountain on which the four VHF-TV stations for the Denver area will be located. Perhaps one UHF station will also be located there. The transmitter for the Public Service of Colorado's and our own company's two-way radio system is also located in this same area. These stations will all be on a bus some one-half mile in length, which will be supplied from two feeders, through two breakers with automatic throwover.

Plans for 1953 call for additional 4/0, 13,200-v feeders to reinforce our system in the Arapahoe district. The addition of 2,000 kva of substation capacity in the city of Englewood and 2,500 kva in the city of Littleton is planned. We also intend to complete the cutover of the fringe area of the Arapahoe and Jefferson County districts from 4,160 v wye to 13,200/7,620 v wye. We also plan to build a new 4/0 aluminum 13,200-v feeder some five miles in length to serve our mountain home customers in the Jef-





City of Colorado Springs will complete this 15,000-kw unit (left) in 1953. Colorado Central Power continues to add unit substations

ferson County area. We will put into service a 2,500-kva, 46,000/13,200/7,620-v substation in our south Weld County district serving the towns of Hudson and Keenesburg as well as some 100 irrigation pumping customers in the rural areas. This substation has been completed and as soon as the cutover from 7,500 v delta to 13,200/7,620 v wye is completed this station will be put into service. These additions will bring additional substation capacity for 1953 to 7,000 kva with an increase of 5,000 kva in distribution transformer capacity.

Additional mercury-vapor street lighting will be added to Englewood, Littleton and Golden system during the year.—*Lee R. Jones, vice-president in charge of operation and construction.*

Colorado Springs PU Dept.

In 1952 $4,000,000 were spent for new facilities, consisting mainly of most of the equipment and a large part of the erection of a new 30,000-kw steam plant. The scheduled start-up of the first unit has been delayed four or five months beyond the original October 1952 date.

Included in the expenditures is also our share of the cost of a joint 115-kv tie line with the Southern Colorado Power Co. at Pueblo and the usual additions to distribution facilities.

The 1953 budget calls for $1,690,000 to complete the new steam plant and to make the ordinary additions and betterments.—*F. H. Wiley, superintendent, electric division.*

Public Service of Colorado

The Public Service Co. of Colorado spent approximately $14,500,000 on construction projects during 1952, of which about $10,000,000 were for electric facilities. The 1953 construction program is presently set at $20,200,000 with electric facilities requiring $15,100,000 of the total.

Although no additional generating capacity was placed in service during 1952, the program of generating plant construction continued apace. Work on the 66,000 kw addition at Zuni station in Denver dropped behind schedule because of the steel strike and other unforeseen delays. It now appears that this unit will not be in commercial operation until January 1954. During 1952 construction was started on a 10,000-kw addition to the Alamosa steam-electric station. This addition will nearly double the generating capacity at Alamosa and will assure adequate capacity for growth in this area.

During 1952 the company placed in service the second circuit of a double-circuit 115-kv transmission line extending from the Arapahoe station to Leetsdale substation and a 69-kv line between Sargent and Homelake substations in the San Luis Valley in south central Colorado.

A total of 71,000 kva in substation capacity and approximately 179 miles of distribution line was placed in service during the year.

Approximately 12,600 new electric customers were added during 1952, and the system peak reached 350,105 kw in December 1952.

Three generating plant projects will be under construction during 1953. In addition to the Zuni and Alamosa plants, mentioned above, work will be started on a new 100,000-kw unit scheduled for commercial operation in 1955.

The 1953 construction program includes the completion of a second 115-kv transmission line between Dillon and Robinson to reinforce service in the Leadville-Climax mining area, and a nine-mile 115-kv line in the northwest Denver area to serve the Arvada terminal. New substation construction will add 92,000 kva of transformer capacity, and it is estimated that 160 miles of new distribution lines will be required to supply new customers and additional load.—*M. M. Koch, vice-president, electric operations.*

Southern Colorado Power

Expenditure for new construction in 1952 amounted to $813,181. For 1953 the total authorized is $1,323,560 of which $409,740 is expected to carry over into 1954 on account of delayed deliveries, leaving a net of $913,820.

One of the principal items in this year's budget is $191,927 for transmission. This includes completion of our

Latest development of Idaho Power on Snake River is the C. J. Strike 82,500-kw plant

half, or 25 miles, of the 115-kv, 20,000-kw transmission line between Pueblo and Colorado Springs, and a 36-mile tap off this line to Canon City, Colo.—*M. G. Lord, vice-president in charge of operation.*

Idaho

Albeni Falls Dam
Army Engineers

Albeni Falls Dam is a multiple-purpose project under construction on the Pend Oreille River in Bonner County, northwest Idaho, and is two miles east of the Idaho-Washington state line and Newport, Wash. Flood control, navigation, hydroelectric power, recreation and conservation are objects of its construction, which was planned as an important unit in the comprehensive development of the Columbia River and its tributaries.

Progress Report

Dam excavation, cofferdams, and concrete placement for the spillway and abutments were completed in 1951. The fiscal year 1951 appropriation was $2,900,000. Congress appropriated $10,000,000 for continuation of construction during fiscal year 1952. Total construction costs are estimated at approximately $31,000,000.

Work accomplished in fiscal year 1952 was completion of the spillway structure, the power house cofferdams and the unwatering of the power house enclosure. Control of storage in Lake Pend Oreille thus was gained in June 1952 and this storage was released during the fall for use in the power houses at Grand Coulee and Bonneville Dams on the Columbia River. As the stream flow on the Columbia River system during the latter part of 1952 was near the lowest of record, additional storage at Albeni Falls assisted greatly toward carrying the Northwest Regional Power System load. Contract was awarded in March 1952 for power house construction at a cost of $8,600,000. This work was approximately 45% complete as of Jan. 1, 1953.

Power house construction is scheduled for completion early in 1954, with equipment installation by separate contracts to begin early in 1953 and be completed in 1955. The three generators will have a total rated capacity of 42,600 kw to add to the federal system harnessing the Columbia River and tributaries. Usable storage for the project has been revised to 1,153,000 acre-ft. When this storage is released through existing federal plants downstream, it will add some 100,000 kw of prime power to the system. This contribution will increase materially as the Chief Joseph and McNary hydroelectric projects, now under construction on the Columbia, come on the line.

Idaho Power

Idaho Power Co.'s load and its capacity to serve that load were both significantly increased during 1952. The program of capacity increase was highlighted by the completion of the company's largest generating station and the first steel-tower transmission line.

The C. J. Strike 82,500-kw hydroelectric development was dedicated on June 8. However, the first two of the three generating units were placed in service early in March. This development is the sixth since the recent world war in an expansion program that has increased the system generating capacity by more than three times.

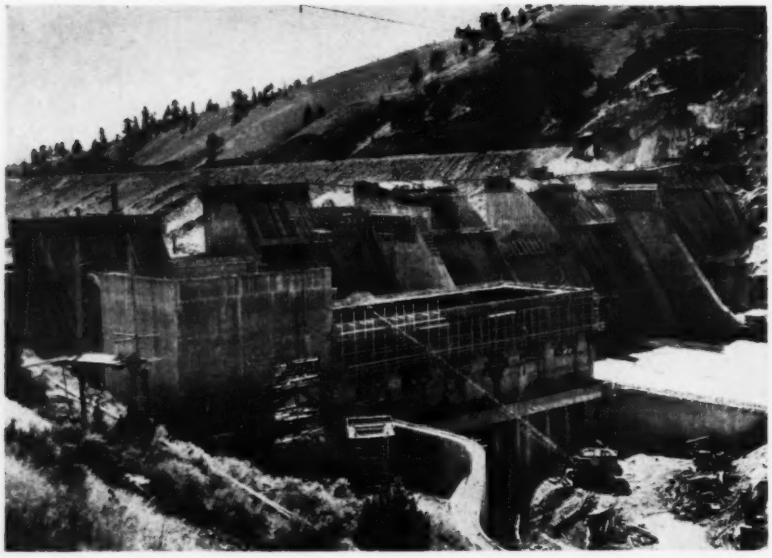
Coincident with the development of increased generating capacity is the construction of transmission facilities. During the past year the company's first steel-tower line was constructed between the American Falls power plant and the Don substation. It serves both the 46-kv load in the east end of the system and the electric phosphorous furnaces of the Westvaco Chemical Division of Food Machinery & Chemical Corp.

Total system peak load reached 315,000 kw in 1952, an increase of 36,000 kw over 1951. The largest single load to be added was that of one new 25,000-kw furnace at Westvaco, which brings the installed Westvaco load to approximately 75,000 kw. The general business load, based on kilowatt-hour sales, increased by approximately 10% over the preceding year.

Total construction expenditures for the year amounted to $9,000,000, classified as follows: production, $2,600,000; transmission, $1,400,000; substations, $2,350,000; distribution, $2,400,000; general, $250,000.

Expenditures on power plants consisted almost entirely of the completion of the Strike project. Transmission lines included the steel-tower line from American Falls to Don substation, a 69-kv line from Vale to Unity, in Oregon, and transmission tie-in of the Strike project. A total of 159,000 kva of substation capacity was added, with the largest single installation being 87,500 kva at Don. Distribution construction was made up of a great many small extensions and reconstruction jobs necessitated by increased loads. There was no large single rural development because the territory has been almost completely electrified.

Present plans for construction during 1953 include the starting of an additional hydro power plant to be placed in operation in the summer of 1955. In addition, a 161-kv transmis-



Canyon Ferry Dam and 50,000-kw plant (left), Missouri Basin Project. Precision testing is required on hydraulic machinery, USBR

sion line, approximately 50 miles long, will be constructed between the Don substation and the Goshen substation of Utah Power & Light Co.; and a 138-kv transmission line, approximately 45 miles long, will be constructed between the King substation and Eden. These lines, together with several transmission lines of lower voltage, bring the transmission construction budget to $2,500,000 for the year. Miscellaneous substation construction requirements total about $2,200,000 and involve additions to more than 30 substations. Distribution line additions and improvements are expected to total $2,600,000. Total construction expenditures may exceed $12,000,000.—*B. C. Russell, general superintendent.*

Palisades Project, USBR

In May 1952 construction began on Palisades Dam and the 114,000-kw Palisades power plant in Idaho. The dam is the largest earthfill dam ever to be undertaken by the Bureau of Reclamation. The first of the plant's four 28,500-kw generators is scheduled to go on the line in December 1956; full generation of power is planned by the fall of 1957.

Montana

Hungry Horse Project, USBR

Concrete placement in the 564-ft-high Hungry Horse Dam in Montana was completed in October. The first of the power plant's four 71,250-kw generators was placed in operation on Oct. 1, and the second unit went on the line on Dec. 1. Installation of the remaining two generators is proceeding. The 285,000-kw plant is to be in full operation by late 1953. Construction of the dam and power plant, under a completion contract, is more than three-fourths finished.

Libby Dam Army Engineers

Libby Dam site is located on Kootenai River a short distance upstream from the town of Libby, Mont. The project will consist of a straight concrete gravity dam with a crest length of approximately 3,000 ft and a maximum height of 450 ft, a power house with an installed capacity of 660,000 kw, and a reservoir with a usable capacity of 6,483,000 acre-ft. The project is a key unit in the Corps of Engineers' comprehensive plan for development of the water resources of the Columbia River Basin in the interest of flood control, power generation and related water uses.

The storage provided by Libby Dam will afford almost complete control of floods along Kootenai River, especially in the Kootenai Flats between Bonners Ferry, Idaho, and Kootenay Lake, British Columbia, and will substantially reduce flood stages along the lower Columbia River. In addition, the project will so regulate the Kootenai River that additional power will be produced at plants on the main stem of Columbia River and on Kootenai River below Libby Dam. Although secondary in nature, benefits to navigation and recreation also will accrue to the project.

Planning Started in 1952

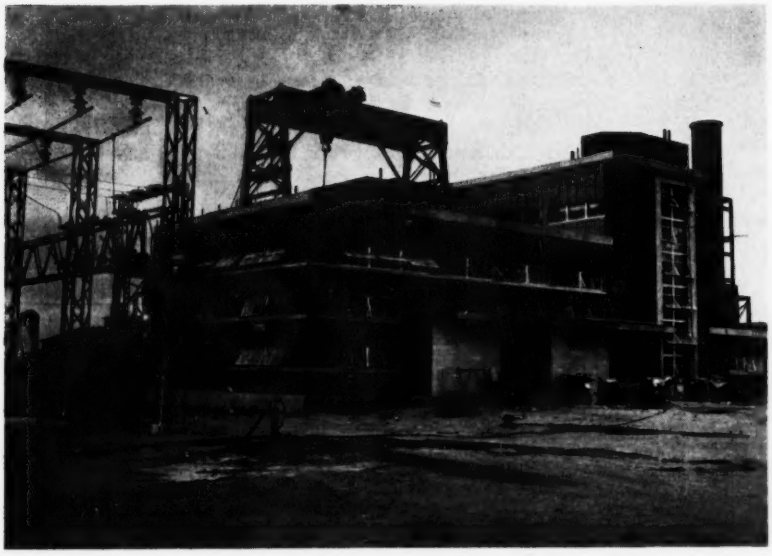
Definite project planning was initiated in January 1952, after President Truman had certified the project as essential in the interests of the national defense. During 1952 the Chief of Engineers, U. S. Army, allocated $285,000 for planning and preliminary engineering on Libby Dam. No construction work has been done. Cost of the project is currently estimated at $284,336,000.

Montana Power

Preliminary work on a new unit at Kerr hydroelectric development in western Montana and a system-wide program designed to enlarge and strengthen distribution facilities to meet increased load requirements highlighted the Montana Power Co.'s 1952 construction program.

Work on the Kerr No. 3 unit, which will add 56,000 kw to that plant, will continue in 1953, with the unit expected to go into operation in 1954.

During the year, the company enlarged distribution facilities in the cities of Great Falls and Missoula; built a tie line between the company's Anaconda-Grace substation and Bonneville Power Administration's substation near Anaconda, and did extensive work necessary to facilitate service to the city of Butte and the Anaconda Copper



Ultramodern Person plant (left) of Public Service of New Mexico. Right: One of two 30-kv lines of USBR on Missouri Basin Project

Mining Co.'s Greater Butte mining project.

Principal work scheduled in 1953, in addition to the Kerr job, includes construction of additional transmission lines connecting the company's Kerr and Thompson Falls projects; reconductoring of lines west interconnecting with the Northwest Power Pool; increasing capacity of the Anaconda-Grace and A. C. M. smelter substations at Anaconda; construction of new transmission facilities in the Lewistown area, and enlargement of distribution facilities in Anaconda, Billings, Butte and Bozeman.

Nevada

Sierra Pacific Power

Sierra Pacific Power Co. spent approximately $1,700,000 in 1952 for new construction, replacements and betterments in its electric department. Major projects included were: installation of a 10,000-kva 66/23-kv substation to augment supply to the Reno-Sparks 23-kv subtransmission loop; addition of a 20,000-kva 66-kv voltage regulator at Washoe substation; construction of 39 miles of 66-kv line extending from Carson City to Yerington, including switching station at each end for connection into the 66-kv network, partially completed; addition of a 3,750-kva 23/4-kv transformer bank at Sutro substation in Reno. Replacements of dam and gate structure at Fleish hydro plant diversion, washed out by high water, and forebay structure at this plant were in progress.

Construction budget for 1953 totals about $1,750,000. A new 66-kv H-frame line 29 miles in length, designed for future operation at 120 kv, will be completed between Washoe substation and Carson City. A 66-kv H-frame line nine miles in length will be built between Washoe substation and Valley Road substation, Reno; this line will also be designed for future operation at 120 kv. Fifteen miles of 66-kv line will be constructed between Carson City and Minden; initial operation at 23 kv. New substation work will include an additional 3,000-kva 66/13.8-kv transformer bank at Tahoe City, Calif., and two new substations for supply to Reno 4-kv system, rated at 2,000 and 2,500 kva. Various reinforcements of the 23-kv and 4-kv feeder system in Reno and Sparks are contemplated.—*V. D. Armstrong, executive engineer.*

New Mexico

Public Service of N.M.

During 1952 approximately $6,650,000 were spent in capital improvements by the four divisions of the Public Service Co. of New Mexico. A total of approximately $7,000,000 has been budgeted for similar purposes in 1953.

In October 1952 we put in service a new generating station in Albuquerque called Person Station. The first unit, rated at 20,000 kw, went into service at that time. We have already started construction on the installation of a second 20,000-kw unit at this plant, which is due to go into service in October 1953. A third unit, rated at 30,000 kw, is already on order and is scheduled to go into service in the winter of 1954.

Approximately four miles of transmission line and 64 miles of distribution line were added in 1952. We are at present working on a 115-kv line between Santa Fe and Las Vegas. This line will be approximately 60 miles long and is scheduled for completion late in 1953. We have also budgeted for 1953 an additional 44-kv line between Albuquerque and Belen. This line will be about 32 miles long.

A 25,000/37,500-kva transformer was installed in the transmission substation at Person station to take care of the new unit. We also installed about 7,500 kva in distribution substation capacity. In 1953 we will also install a 25,000/37,500-kva transformer at the Person station transmission substation to take care of the new unit which will be installed there. Approximately 20,000 kva in distribution substation capacity are budgeted for the year 1953.

The Albuquerque-Santa Fe system peak increased from 58,600 kw in 1951 to 66,000 in 1952, for an increase of approximately 12.5%.

Kilowatt-hour output for the entire property has increased 12.2% in the last twelve months.—*E. M. Conwell, general superintendent.*

Oregon

Bonneville Power Administration

Peak energy demand on Bonneville and Grand Coulee plants was 2,867,000 kw 12:00 to 1:00 p.m. Aug. 13, 1952. These two plants and Hungry Horse, which commenced operations on Oct. 29, 1952, produced 18,000,000,000 kwh during 1952 for distribution over Bonneville Power Administration's transmission system to 112 customers. Revenue from the sale of this power amounted to about $39,000,000. Increases over the 1951 calendar year were: peak demand, 3.0%; generation for BPA, 1.8%; number of customers, 2.8%; and revenues, 3%.

Expenditures for new and improved facilities during 1952 amounted to $61,500,000. Approval of the present budget before Congress will provide an estimated $60,000,000 in 1953. The estimate is based on a transmission line program that will keep pace with the schedule of additional generating plant installations. Transmission system additions during 1952 included 589 miles of 230 kv and 203 miles of 115 kv, with 1,508,734 kva of transformer capacity. Plans for 1953 call for 560 miles of 230-kv and 119 miles of 115-kv line, with added transformer capacity of 812,000 kva.

Peak generating capacity was increased by about 115,000 kw with installation of the first two units at Hungry Horse operating at a reduced head. Ultimate peak capacity of these units will be 150,000 kw, and with completion of the final two units in 1953, total peak capacity of the Hungry Horse plant will be 300,000 kw.

Peak requirements of approximately 8,000,000 kw will need to be met by the federal system in January 1960, according to the most recent estimates of the Bonneville Power Administration. This represents about double the current load. In order to provide for reserves and the replacement of steam electric generation, in addition to firm power requirements, total federal installations in the Pacific Northwest region of over 8,400,000 kw are planned for installation by January 1960.

California Oregon Power

During the year 1952 the principal items of plant additions were completion of the Soda Springs and Fish Creek hydroelectric plants on the North Umpqua River, aggregating 22,000 kw, partial construction of two more hydroelectric plants on the North Umpqua River—Clearwater No. 1 and Clearwater No. 2—aggregating 41,000 kw, and construction of 136 miles of transmission line—one between Dixonville and Grants Pass, another between PG and E Pit No. 1 plant and Tulelake, and part of a third between our Soda Springs plant and Dixonville. Other production and transmission plant improvements, together with expansion of the company's distribution facilities, required a budget in excess of $14,000,000.

The retail system demands increased about 40,000 kw during 1952.

Based upon forecast rate of growth for the year 1953, it is evident that the company's expansion program will have to continue at the same or an accelerated rate with a budget exceeding $15,000,000. Most of this expansion will come in the completion of construction of the two plants on the North Umpqua River and the starting of two more plants, together with the substation and transmission facilities required for distribution of the additional plant capacity throughout the company service area.—*J. C. Boyle, vice-president and general manager.*

Eugene Water & Electric Board

The year 1952 saw completion of a major expansion program begun immediately following the close of World War II.

The largest single expenditure was for a combined warehouse and office costing $200,000. In the electric distribution system $640,000 were spent for raising voltages from 2,400 to 12,000, building some more of the 66,000-v loop to surround the city and a substation, purchasing transformers and supplying the usual run of smaller capital items. A second 66,000-v transmission line six miles in length between the Walterville and Leaburg plants was completed; $80,000 were spent on this. $43,000 were required to complete the improvements to the two hydro plants, which now have a total capability of 23,000 kw in an average water year. The small amount of $15,000 was spent on the steam plant, which has a capability of 32,000 kw. The steam plant has been operating continuously at near full load for several months to supply energy to the Northwest Power Pool during the current power shortage. An addition of $176,000 to general plant and equipment brought the total for all capital expenditures to $1,154,000.

For 1953, $985,000 has been budgeted for capital additions, largely in improvements to the distributing system. Also studies will be continued on the possibility of developing about 100,000 kw of prime power on the upper reaches of the McKenzie River. A transmission line 70 miles in length would be required to bring this power to Eugene.

The number of customers is approximately 21,000.—*F. Ford Northrop, assistant superintendent.*

McNary Dam Army Engineers

McNary Lock and Dam presently under construction on the Columbia River, Oregon and Washington, is located three miles east of Umatilla, Ore., and 292 miles upstream from the mouth of the river. McNary Lock and Dam is a multiple-purpose project primarily being constructed for power and navigation. The project consists of a dam; hydroelectric power plant; navigation lock; accommodations for public use of the reservoir and facilities for passage of migratory fish.

Total estimated cost of the project based on the 1952 price index is $282,820,000. Appropriations for McNary Dam for fiscal year 1953 were $62,604,000. Allotments to date have amounted to $217,689,000, and based on the 1952 price index an additional amount of $65,131,000 will be required to complete the project.

The over-all length of the combined structures of the dam is about 7,300 ft. The spillway dam is a concrete structure 1,310 ft long with a maximum height of 187 ft from lowest foundation to deck, and is controlled by 22 fixed wheel lift gates 50 by 52 ft in dimension. Design capacity of the spillway is 2,200,000 cfs, with a maximum water surface elevation at the dam of 356.5 ft, mean sea level. The navigation lock has net clear dimensions of 86 ft by 675 ft, and will have a maximum lift of 92 ft. Time for filling and emptying of the lock under maximum lift will be 16 minutes for each operation. The power house, with an installed generating capacity of 980,000 kw, has 14 units of 70,000 kw each, has an over-all length of 1,422 ft, a maximum height of 185 ft from the draft tube foundation to the intake deck, and a maximum width of 248 ft from the toe of the intake structure to the downstream face of the power house fish collection channel. All 14 units of the power house will be installed initially with the first two units on the line in December 1953 and the remaining 12 units to follow at intervals of three-month periods thereafter. In addition to the present power house, six additional generating units can be pro-

Army Engineers have scheduled first 70,000-kw unit at McNary (left) for December 1953. Right: Turbine runner for Yale plant, PP&L

Calendar of New Generation—U. S. Columbia River Power System

(Most of these units are included on the complete Calendar of New Generation on pp 112-113.)

1952—Completed

Date	Size—Kw	Plant	Agency
Oct.	71,250 (H)	Hungry Horse 1	USBR
Dec.	71,250 (H)	Hungry Horse 2	USBR
Total	142,500		

1953—Planned

Date	Size—Kw	Plant	Agency
June	50,000 (H)	Detroit 1	Army Eng.
Aug.	71,250 (H)	Hungry Horse 3	USBR
Oct.	50,000 (H)	Detroit 2	Army Eng.
Nov.	71,250 (H)	Hungry Horse 4	USBR
Dec.	140,000 (H)	McNary 1 and 2	Army Eng.
Total	382,500		

1954—Planned

Date	Size—Kw	Plant	Agency
March	70,000 (H)	McNary 3	Army Eng.
April	18,000 (H)	Big Cliff 1	Army Eng.
June	70,000 (H)	McNary 4	Army Eng.
Aug.	14,200 (H)	Albeni Falls 1	Army Eng.
Sept.	70,000 (H)	McNary 5	Army Eng.
Oct.	76,000 (H)	Lookout Point 1 and 2	Army Eng.
Dec.	70,000 (H)	McNary 6	Army Eng.
Dec.	14,200 (H)	Albeni Falls 2	Army Eng.
Total	402,400		

1955—Planned

Date	Size—Kw	Plant	Agency
Feb.	38,000 (H)	Lookout Point 3	Army Eng.
March	70,000 (H)	McNary 7	Army Eng.
April	14,200 (H)	Albeni Falls 3	Army Eng.
April	15,000 (H)	Dexter 1	Army Eng.
June	70,000 (H)	McNary 8	Army Eng.
Sept.	70,000 (H)	McNary 9	Army Eng.
Sept.	12,000 (H)	Chandler 1 and 2	USBR
Sept.	192,000 (H)	Chief Joseph 1, 2 and 3	Army Eng.
Dec.	64,000 (H)	Chief Joseph 4	Army Eng.
Dec.	70,000 (H)	McNary 10	Army Eng.
Total	615,200		

1956—Planned

Date	Size—Kw	Plant	Agency
March	70,000 (H)	McNary 11	Army Eng.
March	64,000 (H)	Chief Joseph 5	Army Eng.
June	64,000 (H)	Chief Joseph 6	Army Eng.
June	70,000 (H)	McNary 12	Army Eng.
Sept.	70,000 (H)	McNary 13	Army Eng.

1956—Planned—Continued

Date	Size—Kw	Plant	Agency
Sept.	64,000 (H)	Chief Joseph 7	Army Eng.
Oct.	10,000 (H)	Roza 1 and 2	USBR
Oct.	10,000 (H)	American Falls 1	USBR
Dec.	10,000 (H)	American Falls 2	USBR
Dec.	28,500 (H)	Palisades 1	USBR
Dec.	70,000 (H)	McNary 14	Army Eng.
Dec.	64,000 (H)	Chief Joseph 8	Army Eng.
Total	594,500		

1957—Planned

Date	Size—Kw	Plant	Agency
Feb.	10,000 (H)	American Falls 3	USBR
March	28,500 (H)	Palisades 2	USBR
March	64,000 (H)	Chief Joseph 9	Army Eng.
June	64,000 (H)	Chief Joseph 10	Army Eng.
June	28,500 (H)	Palisades 3	USBR
Sept.	28,500 (H)	Palisades 4	USBR
Sept.	12,500 (H)	Upper Scriver Creek 1	USBR
Sept.	30,000 (H)	Lower Scriver Creek 1	USBR
Sept.	64,000 (H)	Chief Joseph 11	Army Eng.
Nov.	12,500 (H)	Upper Scriver Creek 2	USBR
Nov.	30,000 (H)	Lower Scriver Creek 2	USBR
Nov.	27,000 (H)	The Dalles (2 fishway)	Army Eng.
Nov.	156,000 (H)	The Dalles 1 and 2	Army Eng.
Dec.	64,000 (H)	Chief Joseph 12	Army Eng.
Dec.	130,000 (H)	Ice Harbor 1 and 2	Army Eng.
Total	749,500		

1958—Planned

Date	Size—Kw	Plant	Agency
Jan.	12,500 (H)	Upper Scriver Creek 3	USBR
Feb.	78,000 (H)	The Dalles 3	Army Eng.
March	64,000 (H)	Chief Joseph 13	Army Eng.
April	65,000 (H)	Ice Harbor 3	Army Eng.
May	78,000 (H)	The Dalles 4	Army Eng.
June	64,000 (H)	Chief Joseph 14	Army Eng.
July	100,000 (S)*	Thermal Plant 1	BPA
Aug.	78,000 (H)	The Dalles 5	Army Eng.
Aug.	65,000 (H)	Ice Harbor 4	Army Eng.
Sept.	64,000 (H)	Chief Joseph 15	Army Eng.
Sept.	100,000 (H)	Hells Canyon 1	USBR
Oct.	100,000 (S)*	Thermal Plant 2	BPA
Nov.	78,000 (H)	The Dalles 6	Army Eng.
Dec.	64,000 (H)	Chief Joseph 16	Army Eng.
Dec.	100,000 (H)	Hells Canyon 2	USBR
Total	1,110,500		

*May include some gas turbines
(H) Hydro
(S) Steam

vided in the future by removing a section of the earth embankment of the Oregon shore of the river. The construction of McNary Dam involved the relocation of miscellaneous facilities including 91 miles of existing railroad and 43 miles of highway, including bridges, parks, cemeteries, approximately 105 miles of utilities and the acquisition of 46,224 acres of land. About 17 miles of levees are also required to be constructed to provide protection to developments located in the upstream pool area in the vicinity of Pasco, Kennewick and Richland, Wash.

Major construction work completed during the past year at the dam included completion of the excavation for the power house and spillway and placing of approximately 680,000 cu yd of concrete during the period December 1951 to May 1952. This concrete has gone into the intake and substructures of power house and ogee section and stilling basin of spillway.

Total construction on the project as of the latter part of 1952 is approximately 61% complete, and the amounts of completion as of the same period on several of the major items of construction are as follows: Navigation facilities are approximately 98% complete; spillway and abutments are approximately 84% complete; cofferdams are approximately 94% complete; power facilities are approximately 43% complete; fish passing facilities are approximately 79% complete; levee and drainage facilities 66% complete and reservoir clearing operations are approximately 49% complete.

Minimum pool has been maintained at elevation 271 in the McNary reservoir to assist navigation above the dam, and the pool is scheduled to be raised to elevation 335 in the late spring of 1953.

River traffic through McNary navigation lock during 1951 amounted to 1,110,187 gross vessel tons, which included 454,476 tons of commodities. River traffic through McNary navigation lock during November 1952 amounted to 71 commercial towboats and 63 barges upstream and 71 commercial towboats and 65 barges downstream.

The number of contractors' personnel at the dam at the present time is approximately 1,375 in comparison with a peak number of 3,500 earlier in the year. The number of Corps of Engineers personnel now working at the project is 300.

In regard to the information requested on the form pertaining to electrical distribution, these data can best be obtained by contacting the Bonneville Power Administration, Portland, Ore.

Aside from McNary Lock and Dam discussed above the only hydroelectric power development planned for completion by this district before 1958 is Ice Harbor Lock and Dam on Lower Snake River. Funds for the project

Calendar of New Generation

(1951 installations have been dropped and 1958 added)

1952—Completed

Date	Size—Kw	Plant	Agency
Jan.	12,500 (S)	Zuni	PS of Colorado
Spring	82,500 (H)	C. J. Strike	Idaho Power
March	11,000 (H)	Soda Springs	Calif. Oregon Power
April	37,500 (H)	Control Gorge	L.A. Dept. of W&P
April	50,000 (H)	Hoover	USBR
May	82,500 (H)	Hoover	USBR
May	30,000 (S)	Highgrove	Calif. Elec. Power
May	37,500 (H)	Middle Gorge	L.A. Dept. of W&P
May	34,500 (S)	Kyrene	Salt River Power Dist.
June	11,000 (H)	Fish Creek	Calif. Oregon Power
Aug.	7,500 (H)	Boysen	USBR
Aug.	30,000 (S)	El Centro	Imperial Irrig. Dist.
Sept.	7,500 (H)	Boysen	USBR
Sept.	82,500 (H)	Hoover	USBR
Sept.	4,000 (S)	Lafayette	PS of Colorado
Sept.	50,000 (S)	Silver Gate	San Diego G&E
Sept.	22,500 (H)	Rock Island	Chelan PUD
Sept.	50,000 (H)	Cabinet Gorge	Washington Water Power
Oct.	70,000 (S)	Gadsby	Utah P&L
Oct.	71,250 (H)	Hungry Horse	USBR
Oct.	22,500 (H)	Rock Island	Chelan PUD
Oct.	20,000 (H)	Person	PS of N. M.
Oct.	117,500 (S)	Moss Landing	PG and E
Fall	60,000 (H)	Wahleach	B. C. Elec.
Winter	15,500 (H)	T. W. Sullivan	Portland GE
Nov.	27,000 (H)	Cushman No. 2	Tacoma PU Dept.
Nov.	22,500 (H)	Rock Island	Chelan PUD
Nov.	54,000 (H)	Yale	Pacific P&L
Nov.	50,000 (H)	Cabinet Gorge	Washington Water Power
Dec.	71,250 (H)	Hungry Horse	USBR
Dec.	90,000 (H)	Ross	Seattle Lighting Dept.
Dec.	54,000 (H)	Yale	Pacific P&L
Dec.	29,000 (H)	Bear River	PG and E
Dec.	117,500 (S)	Moss Landing	PG and E
Total	**1,535,000 kw**	**(S) 486,000 kw**	**(H) 1,049,000 kw**

1953—Planned

Date	Size—Kw	Plant	Agency
Feb.	15,000 (S)	George Birdsall	Colo. Springs PU Dept.
Feb.	22,500 (H)	Rock Island	Chelan PUD
Feb.	50,000 (H)	Cabinet Gorge	Washington Water Power
March	90,000 (H)	Ross	Seattle Lighting Dept.
March	22,500 (H)	Rock Island	Chelan PUD
March	100,000 (S)	Etiwanda	So. Calif. Edison
Spring	15,000 (H)	Clearwater No. 1	Calif. Oregon Power
May	33,250 (H)	Pole Hill	USBR
May	31,500 (H)	Flatiron	USBR
May	37,500 (H)	Middle Gorge	L.A. Dept. of W&P
May	22,500 (H)	Rock Island	Chelan PUD
May	20,000 (S)	DeMoss-Petrie	Tucson GL&P
June	100,000 (S)	Etiwanda	So. Calif. Edison
June	50,000 (H)	Detroit	Army Eng.
July	31,500 (H)	Flatiron	USBR
July	30,000 (S)	Highgrove	Calif. Elec. Power
July	50,000 (H)	Cabinet Gorge	Washington Water Power
Summer	235,000 (S)	Contra Costa	PG and E
Summer	26,000 (H)	Clearwater No. 2	Calif. Oregon Power

1953—Planned—Continued

Date	Size—Kw	Plant	Agency
Aug.	71,250 (H)	Hungry Horse	USBR
Aug.	10,000 (H)	Drop No. 2	Imperial Irrig. Dist.
Sept.	30,000 (S)	Burbank	Burbank PS Dept.
Sept.	16,667 (H)	Canyon Ferry	USBR
Sept.	90,000 (H)	Ross	Seattle Ligting Dept.
Autumn	3,800 (H)	Murphys	PG and E
Oct.	20,000 (S)	Person	PS of N.M.
Oct.	20,000 (S)	Glendale	Glendale PS Dept.
Oct.	50,000 (H)	Detroit	Army Eng.
Nov.	71,250 (H)	Hungry Horse	USBR
Nov.	16,667 (H)	Canyon Ferry	USBR
Nov.	10,000 (S)	Alamosa	PS of Colorado
Nov.	15,000 (S)	George Birdsall	Colo. Springs PU Dept.
Nov.	40,000 (S)	Highgrove	Calif. Elec. Power
Dec.	100,000 (S)	Valley	L. A. Dept. of W&P
Dec.	70,000 (H)	McNary	Army Eng.
Dec.	70,000 (H)	McNary	Army Eng.
Total	**1,686,884 kw**	**(S) 715,000 kw**	**(H) 971,884 kw**

1954—Planned

Date	Size—Kw	Plant	Agency
Jan.	16,667 (H)	Canyon Ferry	USBR
Jan.	66,000 (S)	Zuni	PS of Colorado
Jan.	40,000 (S)	Pasadena	Pasadena L&P Dept.
March	70,000 (H)	McNary	Army Eng.
Spring	600,000 (S)	Pittsburg	PG and E
April	18,000 (H)	Alcova	USBR
April	100,000 (S)	Valley	L.A. Dept. of W&P
April	18,000 (H)	Big Cliff	Army Eng.
May	40,000 (S)	DeMoss-Petrie	Tucson GL&P
June	18,000 (H)	Alcova	USBR
June	69,000 (S)	Kyrene	Salt River Power Dist.
June	125,000 (S)	Redondo No. 2	So. Calif. Edison
June	70,000 (H)	McNary	Army Eng.
June	100,000 (S)	Saguaro	Arizona PS
Aug.	14,200 (H)	Albeni Falls	Army Eng.
Sept.	54,000 (H)	Folsom	USBR
Sept.	56,000 (H)	Kerr	Montana Power
Sept.	70,000 (H)	McNary	Army Eng.
Oct.	15,000 (H)	Eklutna	USBR
Oct.	80,000 (S)	Encina	San Diego G&E
Oct.	30,000 (S)	Person	PS of N. M.
Oct.	38,000 (H)	Lookout Point	Army Eng.
Oct.	38,000 (H)	Lookout Point	Army Eng.
Nov.	54,000 (H)	Folsom	USBR
Winter	29,000 (H)	Lemola No. 1	Calif. Oregon Power
Dec.	50,000 (S)	Honolulu	Hawaiian Elec.
Dec.	156,250 (S)	Valley	L.A. Dept. of W&P
Dec.	66,000 (S)	———	Utah P&L
Dec.	14,200 (H)	Albeni Falls	Army Eng.
Dec.	70,000 (H)	McNary	Army Eng.
———	40,000 (H)	Mayfield	Tacoma PU Dept.
———	40,000 (H)	Bridge River	B. C. Elec.
Total	**2,265,317 kw**	**(S) 1,522,250 kw**	**(H) 743,067 kw**

have been requested and have been included in the Bonneville Power Administration's advanced schedule of proposed power generation.

Mountain States Power

Expenditures by Mountain States Power Co. for additions and betterments during the year 1952 totaled approximately $4,330,000. The construction budget for the year 1953 has been set at $4,580,000.

The 1952 construction program included the completion of 70 miles of transmission line, 45 miles of which were in Wyoming. These additions to the transmission system include several projects, the longest of which extends from the Boysen Dam of the Bureau of Reclamation to Riverton, Wyo. This line, which is 34 miles long and of H-frame construction with 4/0 aluminum conductor, is to be operated at 34.5 kv but is designed for conversion to 57 kv when desirable. A 69-kv line extending from Scio to Lyons, Ore., a distance of approximately 15 miles, was also completed in 1952.

Other transmission facilities include a 20,000-kva substation at Norway, Ore., to connect the company's system in the Coos Bay area with the system of the Bonneville Power Administration. A connection with the system of BPA was also made at Tillamook.

Additions to the transmission system planned for 1953 include a number of small projects, the largest of which is a proposed 33-kv line from the Montford substation near Kalispell, Mont., to Columbia Falls, Mont., a distance of approximately 16 miles. Approximately four miles of 66-kv line and a 5,000-kva substation will be constructed near Sandpoint, Idaho, to provide an additional point of connection between the company's Idaho system and the system of the Washington Water Power Co.

The major portion of the company's capital expenditures completed in 1952 and planned for 1953 were for increased distribution facilities. Rapidly increasing population and renewed activity in irrigation and oil production have made necessary the construction of more than 300 miles of distribution line in each year. Several distribution substations were constructed in 1952 and others are proposed for 1953. These vary in size up to 6,000 kva.

The shortage of hydro energy in the Pacific Northwest caused many of the company's larger customers to reduce their operations in accordance with DEPA orders, but the efficient operation of the Northwest Power Pool has prevented any serious loss of load.—*A. W. Trimble, president.*

Pacific Power & Light

During the year 1952 Pacific Power & Light Co. spent more than $24,000,000 in system additions and improve-

Calendar of New Generation — Continued

(1951 installations have been dropped and 1958 added)

1955—Planned

Date	Size—Kw	Plant	Agency
Jan.	6,750 (H)	Nimbus	USBR
Jan.	15,000 (H)	Eklutna	USBR
Jan.	54,000 (H)	Folsom	USBR
Feb.	38,000 (H)	Lookout Point	Army Eng.
March	6,750 (H)	Nimbus	USBR
March	100,000 (S)	Denver	PS of Colorado
March	70,000 (H)	McNary	Army Eng.
April	14,200 (H)	Albeni Falls	Army Eng.
April	15,000 (H)	Dexter	Army Eng.
June	70,000 (H)	McNary	Army Eng.
June	100,000 (S)	Saguaro	Arizona PS
Summer	90,000 (H)	Ross	Seattle Lighting Dept.
Summer	84,000 (H)	Pit No. 4	PG and E
Summer	300,000 (S)	———	PG and E
Summer	33,000 (H)	Lemola No. 2	Calif. Oregon Power
Aug.	15,000 (S)	Western Slope	PS of Colorado
Sept.	6,000 (H)	Chandler	USBR
Sept.	192,000 (H)	Chief Joseph	Army Eng.
Sept.	70,000 (H)	McNary	Army Eng.
Autumn	50,000 (S)	Buhne Point	PG and E
Nov.	6,000 (H)	Chandler	USBR
Nov.	40,000 (S)	Highgrove	Calif. Elec. Power
Dec.	6,000 (H)	Little Porcupine	USBR
Dec.	156,250 (S)	Valley	L.A. Dept. of W&P
Dec.	64,000 (H)	Chief Joseph	Army Eng.
Dec.	70,000 (H)	McNary	Army Eng.
———	420,000 (H)	Mayfield & Mossyrock	Tacoma PU Dept.
———	85,000 (H)	———	Idaho Power
———	40,000 (H)	Seaton Creek	B. C. Elec.
Total	**2,216,950 kw**	**(S) 661,250 kw**	**(H) 1,555,700 kw**

1956—Planned

Date	Size—Kw	Plant	Agency
Jan.	40,000 (S)	Broadway	Pasadena L&P Dept.
Feb.	6,000 (H)	Little Porcupine	USBR
March	64,000 (H)	Chief Joseph	Army Eng.
March	70,000 (H)	McNary	Army Eng.
April	6,000 (H)	Little Porcupine	USBR
April	5,000 (H)	Deer Creek	USBR
June	1,400 (H)	Wanship	USBR
June	4,000 (H)	Gateway	USBR
June	70,000 (H)	McNary	Army Eng.
June	64,000 (H)	Chief Joseph	Army Eng.
July	82,500 (H)	Hoover N 8	USBR
Sept.	64,000 (H)	Chief Joseph	Army Eng.
Sept.	70,000 (H)	McNary	Army Eng.
Sept.	30,000 (H)	Thompson Falls	Montana Power
Oct.	5,000 (H)	Roza	USBR
Oct.	10,000 (H)	American Falls	USBR
Oct.	100,000 (S)	———	Utah P&L
Winter	50,000 (H)	Big Bend or McCloud	Calif. Oregon Power
Dec.	5,000 (H)	Roza	USBR
Dec.	10,000 (H)	American Falls	USBR
Dec.	28,500 (H)	Palisades	USBR
Dec.	82,500 (H)	Hoover	L.A. Dept. of W&P
Dec.	64,000 (H)	Chief Joseph	Army Eng.

1956—Planned—Continued

Date	Size—Kw	Plant	Agency
Dec.	70,000 (H)	McNary	Army Eng.
———	151,000 (H)	———	Idaho Power
———	30,000 (H)	Pilot Knob	Imperial Irrig. Dist.
———	11,500 (S)	Canon City	So. Colorado Power
Total	**1,194,400 kw**	**(S) 151,500 kw**	**(H) 1,042,900 kw**

1957—Planned

Date	Size—Kw	Plant	Agency
Feb.	10,000 (H)	American Falls	USBR
March	28,500 (H)	Palisades	USBR
March	64,000 (H)	Chief Joseph	Army Eng.
April	2,000 (H)	Tiber	USBR
May	8,000 (H)	Moorhead	USBR
June	5,000 (H)	Molina	USBR
June	28,500 (H)	Palisades	USBR
June	64,000 (H)	Chief Joseph	Army Eng.
Sept.	28,500 (H)	Palisades	USBR
Sept.	64,000 (H)	Chief Joseph	Army Eng.
Winter	50,000 (H)	Big Bend or McCloud	Calif. Oregon Power
Nov.	50,000 (H)	Yellowtail	USBR
Nov.	156,000 (H)	The Dalles	Army Eng.
Dec.	64,000 (H)	Chief Joseph	Army Eng.
Dec.	130,000 (H)	Ice Harbor	Army Eng.
———	20,000 (S)	———	So. Colorado Power
Total	**772,500 kw**	**(S) 20,000 kw**	**(H) 752,500 kw**

1958—Planned

Date	Size—Kw	Plant	Agency
Feb.	50,000 (H)	Yellowtail	USBR
Feb.	78,000 (H)	The Dalles	Army Eng.
March	64,000 (H)	Chief Joseph	Army Eng.
April	24,000 (H)	Glendo	USBR
April	65,000 (H)	Ice Harbor	Army Eng.
May	50,000 (H)	Yellowtail	USBR
May	100,000 (S)	———	Salt River Power Dist.
May	78,000 (H)	The Dalles	Army Eng.
June	20,000 (H)	Sacramento Canal	USBR
June	48,000 (H)	Fremont Canyon	USBR
June	2,400 (H)	Cameo	USBR
June	64,000 (H)	Chief Joseph	Army Eng.
Aug.	50,000 (H)	Yellowtail	USBR
Aug.	78,000 (H)	The Dalles	Army Eng.
Sept.	64,000 (H)	Chief Joseph	Army Eng.
Nov.	78,000 (H)	The Dalles	Army Eng.
Dec.	64,000 (H)	Chief Joseph	Army Eng.
Total	**977,400 kw**	**(S) 100,000 kw**	**(H) 877,400 kw**

(H) Hydro
(S) Steam

ments. Included in this was an item of over $19,000,000 for continuing construction of our Yale hydroelectric project, a 108,000-kw plant on the Lewis River approximately 12 miles upstream from our Merwin plant. The first unit was started up in November and the second unit during December. Work was rushed in order to bring this additional generation into operation because of the critical power situation in the Northwest resulting from low stream flows.

The remainder of the construction expenditures was generally distributed throughout the system and included a continuation of the program for converting the Yakima and Sunnyside distribution systems to 12 kv, with a 22,500-kva 110/12-kv substation being placed in service in Yakima. Two new 5,000-kva 66/2.4-kv substations were completed in Portland. Work was started on the construction of a 20-mile 66-kv line to serve the Pilot Rock Lumber Co. south of Pendleton, with a 5,000-kva substation to be located at Pilot Rock scheduled for operation in March.

A 16-mile 200,000-kva 115-kv line was built from Merwin to Kalama to interconnect with the facilities of the Bonneville Power Administration to provide an outlet for the Yale plant through a connecting 11-mile circuit built in 1951 between Yale and Merwin. Work was started on a 40-mile 66-kv transmission line connecting our Enterprise system with that of the California-Pacific Utilities Co. at Elgin, with substations located at Wallowa and Enterprise and a switching station at Elgin. This line will be placed in service during July 1953. A large amount of transmission and distribution line work is in progress in connection with the flooding of land in the McNary Dam reservoir area. In addition to the construction of one new substation and the removal of two, approximately 24 miles of distribution line are being removed and 16 miles of new line constructed. Twelve miles of 66-kv transmission line are being built to replace 10 miles removed. One steel tower transmission crossing over the Snake River is being relocated and two others are being revamped in connection with this project. This work will be completed by April 1953, at which time the reservoir area will be flooded.

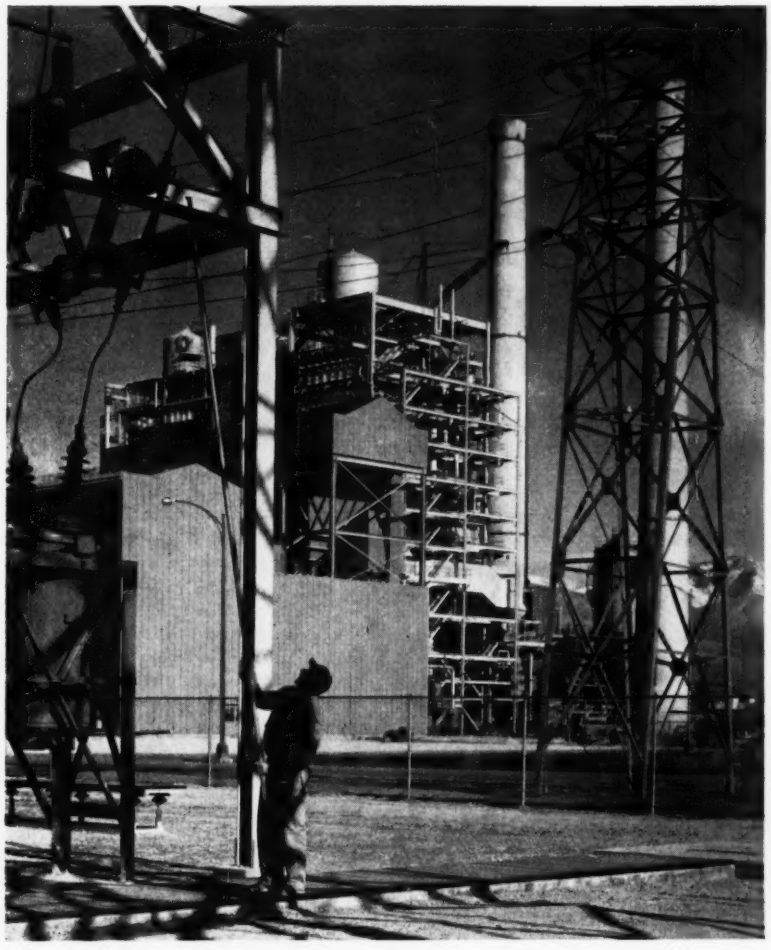
In addition to completing the above projects started in 1952, the 1953 budget provides for completion of the Yakima conversion program and other general system improvements and additions in about the same amount carried out in 1952. Materials will be ordered, right-of-way purchased, and surveying started for a 44-mile 110-kv transmission line down the Yakima Valley from Yakima to Grandview to replace a 66-kv line now serving that area. Five 7,500-kva transformers and necessary regulators are on order for this project.—*J. Coleman Jones, general superintendent.*

Interesting self-priming siphon at T. W. Sullivan plant of Portland General Electric Co.

Portland District Army Engineers

The Portland District, Corps of Engineers, has four projects in operation or under construction which include power development. Bonneville Dam on the Columbia River, 42 miles east of Portland, has been producing power since 1938. Under construction are Detroit project on the North Santiam River, 45 miles southeast of Salem, Ore.; Lookout Point project on the Middle Fork Willamette River, 22 miles southeast of Eugene, Ore.; and The Dalles Dam, three miles east of The Dalles, Ore.

Detroit, a multiple-purpose project, provides for construction of a main dam and reregulating dam, both with power generating facilities. Detroit Dam consists of a concrete-gravity structure, 1,523.5 ft long with a maximum height of 450 ft, a gate-controlled spillway, and a two-unit power house with a total generating capacity of 100,000 kw. The dam will create a reservoir approximately 8.5 miles long, providing 340,000 acre-ft of usable storage for flood control, navigation, irrigation, power and other multiple-purpose uses. The first power generating unit is scheduled to go on the line during June 1953. A concrete-gravity type reregulating dam about 172 ft in height and a one-unit power house with an installed capacity of 18,000 kw will be located 2.8 miles downstream at the Big Cliff site. Use of the dam for reregulating purposes is scheduled to start during October



Gadsby steam plant of Utah Power & Light housed a new 70,000-kw reheat unit in 1952

1953, and the power unit is scheduled to go on the line during April 1954. Facilities for public use of the Detroit reservoir area will be provided, as well as limited facilities for sight-seers at the Big Cliff Dam.

A salmon hatchery and an egg collecting station are included as part of the project. Fish facilities will be operated by the Oregon Fish Commission. Highway relocation work was started in May 1947, and construction of the main dam was initiated in March 1949. The entire project is scheduled for completion early in 1954. Estimated total cost of the project is $69,244,000. It is calculated the dam will prevent average annual flood damages totaling $1,253,000. Annual power benefits for the project are estimated at $2,645,000. Total average annual benefits are estimated at $4,416,000.

The Lookout Point project also includes a main dam and reregulating dam, both with power generating facilities. Lookout Point Dam will consist of an earth and gravel fill with a concrete-gravity, gate-controlled spillway and a three-unit power house, with total installed generating capacity of 114,000 kw. The dam will have a maximum height from foundation to crest of 270 ft, and the spillway will be located in the river channel near the right abutment. Four gate-controlled outlet conduits will pass through the spillway section. Dexter Reregulating Dam, an earth- and gravel-fill embankment with concrete-spillway section, about 107 ft in height, and one-unit power house with an installed capacity of 15,000 kw, will be located 2.7 miles downstream. The project will include facilities for public use of the area and for propagation of existing runs of salmon. All hatchery facilities will be operated by the Oregon Fish Commission. Railroad relocation work was started in May 1947, and construction of the main dam was initiated in July 1949. Completion of the project is scheduled in 1954.

Lookout Point Dam will create a reservoir about 14 miles long providing 351,000 acre-ft of usable storage for flood control, power, navigation and other conservation uses. Cost of the project is estimated at $96,611,000. It is calculated the dam will prevent average annual flood damages totaling $2,784,000. Annual power benefits are estimated at $2,281,000. Total average annual benefits are estimated at $5,912,000.

The adopted plan for The Dalles Dam calls for a power house immediately downstream from Big Eddy, adjacent to a rock-fill closure dam and roughly parallel to the river channel so as to discharge into deep water upstream from Three-Mile Rapids. The power house will consist of 14 main-unit bays, a fish-turbine bay, a station-service bay, and an assembly bay. A skeleton structure will be provided for eight additional main-unit bays, allowing expansion to an ultimate installation of 22 units, each rated at 78,000 kw. A 23-bay concrete-gravity spillway dam with radial gates will be downstream from the power house and roughly at right angles to the river channel so as to discharge into deep water generally downstream from Three-Mile Rapids. A gravity fish ladder will be located at the northerly end of the spillway. A fish transportation channel with pickup entrances at the southerly end of the spillway and at the westerly end of the power house will extend across the power house tailrace structure and connect to a gravity ladder at the easterly end of the power house structure. The latter will also be equipped with a pickup entrance at the easterly end of the tailrace. A navigation lock 86 by 675 ft will be located on the Washington shore. Overall length of the entire dam will be 8,700 ft. Normal pool elevation will be 160 ft mean sea level, and normal tailwater elevation will be about 72.5, as regulated by Bonneville Dam.

Construction work was started in 1952 with excavation for the power house and construction of a cofferdam. First power is scheduled to go on the line in November 1957. Cost of the project is estimated at $348,372,000. Power benefits are estimated at $22,937,000 annually, and total annual benefits at $23,988,000.

Dates of power installations listed above are in accordance with Bonneville Power Administration Schedule "V." Delays in delivery of power equipment may result in modification of these dates.

Portland General Electric

The amount of the 1952 construction budget was $8,500,000. The estimated construction requirement for 1953 is $8,000,000.

The 1951 December system peak without load curtailment was 514,000 kw. The 1952 December system peak with load curtailment was 525,000 kw.

The 1953 estimated construction requirements cover the following construction program.

1. Completing installation of twelve 1,200-kw new induction automatic generating units at the company's Oregon City plant
2. Installation of a 33,000-kva 115/57-kv autotransformer for the company's Grand Ronde BPA interconnection
3. Installation of a 50,000-kva 115/57-kv autotransformer for the company's St. Helens BPA interconnection
4. Installation of two 3,000-kva 57/4.15-kv unit substations and one 10,000-kva 11/4.15-kv transformer bank in Portland to reinforce 4.15-kv system
5. Installation of one 3,000-kva 57/4.15-kv unit substation in Salem and cut three existing 3,000-kva 11/2.4-kv substations in Salem to 4.15 kv
6. Add 18,700 kva to the company's 60/12.5-kv step-down capacity and continue the 12.5-kv cutover program in outlying areas
7. Make two manual substations automatic by installing necessary automatic control and supervisory control equipment
8. Complete program for feeding a-c underground network from new outdoor 11-kv bus structure at station L
9. Provide additional headquarter facilities for Portland and Tualatin Valley Divisions—*John Bankus, chief engineer.*

Utah

Utah Power & Light

Utah Power & Light Co. will spend more than $10,000,000 for construction purposes during 1953—the final year of its $63,000,000 five-year expansion program. Meanwhile, the company is laying additional plans for future building.

Thermal electric plant construction will have required $32,300,000 of the above amount; construction at existing hydro plants, $4,300,000; transmission, $7,700,000; distribution facilities, $15,800,000; and other, $2,900,000.

In December 1952 the second section of the Gadsby steam-electric generating station was placed in service, bringing to 188,000 kw the amount of new steam-electric capacity installed on the system since July 1950.

The second Gadsby unit consists of a single boiler turbine combination. Turbogenerator is a 60,000-kw Handbook machine, 1,450 psi, 1,000 F, with 1,000 F reheat cycle. The plant, which has a net capability of 75,000 kw at unity power factor, is designed to burn gas, oil or coal. Plant is at present burning residual fuel oil but when coal handling equipment is in operation the latter part of January 1953, considerable coal will also be burned. Cost of Gadsby No. 2 is approximately $13,000,000.

Orders have been placed for a 66,000-kw 1,250-psi, 950 F standard preferred unit, which is scheduled for operation in December 1954. This unit will be installed, contingent upon obtaining adequate cooling water, near the coal mines in Carbon County. A plant in this area will burn Carbon County coal and will supply the electric load in the coal mining region, surplus power generated being transmitted toward Salt Lake City area over existing transmission lines. A 16-in. well is now being drilled to obtain a supply of cooling water, but in the event that adequate water is not obtained the plant will be located elsewhere on the Utah Power & Light system.

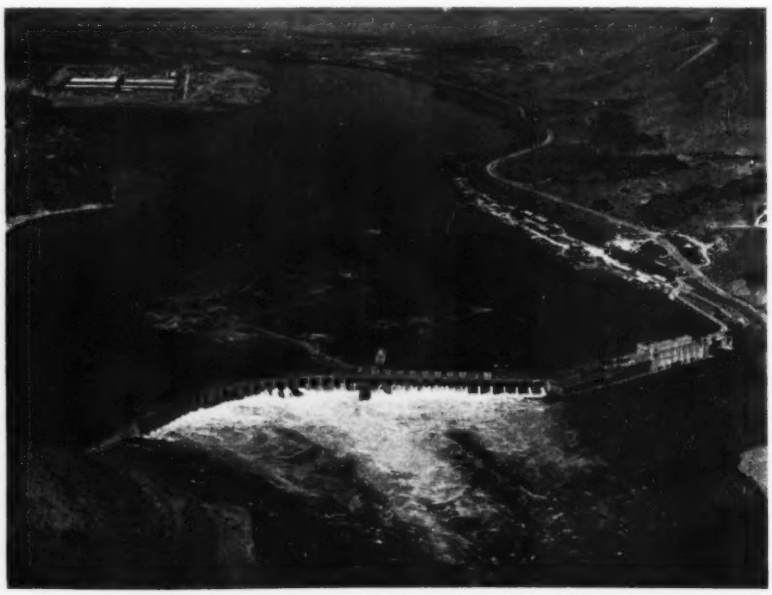
An 80,000-kw, 1,450-psi, 1,000 F Handbook turbogenerator unit with a net capability of 100,000 kw is under construction. Load studies indicate this addition to generating capacity will be required in the fall of 1956. Several sites are under consideration but the location is dependent upon results of an engineering study now being made.

A 1,000-kw diesel unit was added to the isolated Vernal system during 1952.

The company spent $730,000 in 1952 to rebuild or extend 7,600 ft of pipe line serving hydroelectric plants on its system. The remaining portion of the Grace No. 2 flow line was replaced with approximately 5,700 ft of 11-ft-diameter creosoted, wood-stave pipe line and 600 ft of welded-steel pipe at the location where the pipe crosses the Bear River in Idaho. This project, costing $570,000, completes the replacement of this flow line, which originally was constructed in 1913.

During 1952 the Olmsted flow line was extended upstream about 1,300 ft in order to move the point of diversion above a section of the Provo River where mud slides in the past have dammed the stream. A continuous water supply will now be assured for the Olmsted plant, as well as for the Hale steam-electric plant, which takes cooling water from a point just below the Olmsted tailrace. Cost of this flow-line extension is about $235,000.

The company's program of improving flow lines and other hydro facilities will continue, $1,215,000 having been budgeted for this purpose in 1953. Included in this amount are



Additions to Rock Island plant by Chelan PUD near completion. Alcoa plant, upper left

$278,000 to install 11,800 ft of 28-in.-diameter flow line and to recondition and place in service an 870-kw generator at the upper American Fork hydro plant. At the Hyrum hydroelectric plant 14,300 ft of 6-ft-8-in.-diameter wood-stave flow line will be replaced by a 5-ft steel pipe line at an estimated cost of $600,000.

Transmission line extensions and transmission substation capacity increases during 1952 cost $1,420,000. Expenditures for this purpose will be increased to $2,500,000 in 1953.

Extension of distribution facilities for new customers and improvements of existing facilities cost $3,100,000 in 1952. The company plans to spend $3,500,000 for like items in 1953.

In 1952 the company began supplying 130-kv power to an electric furnace of the Monsanto Chemical Co. for the production of elemental phosphorus at Soda Springs, Idaho. The furnace with an interruptible electric demand of 30,000 kw is claimed to be the largest in the world.—*E. A. Hunter, assistant to vice-president.*

Washington

Chelan County PUD

The major project for the year 1952 was the work at the Rock Island plant of Puget Sound Power & Light Co., 13 miles below Wenatchee. By arrangement with Puget, the district is completing the Rock Island plant to its ultimate planned capacity. Three 22,500-kw turbogenerators are now in operation and three more will be completed by May 1953. All of the power generated by these machines is going to the $50,000,000 Alcoa plant located two miles above the dam on the Chelan County side.

On the distribution system a new 1,200-kva substation at Monitor was completed and at Leavenworth a new 4,000-kva package-type substation was installed. Both of these stations replaced existing stations of obsolete type.

The 33-kv system has been increased by the completion of 17 miles of line from Wenatchee to Entiat and 8½ miles of line up the Entiat River to give improved service to existing customers and provide for an increase in load of 400 hp at the C. A. Harris & Sons Lumber Mill at Ardenvoir.

The 1953 construction program is less than for previous years. No major substation is contemplated, and no extension of the 33-kv high voltage distribution system is planned.—*C. H. George, manager.*

Chief Joseph Dam Army Engineers

Progress of Chief Joseph Dam on the Columbia River near Bridgeport in north-central Washington in 1952 amounted to the addition of 430,000 cu yd of concrete in the main dam and start of the power house construction to a total of 109,000 cu yd of concrete. Also, estimate of the total project costs was lowered $12,750,000 to $193,250,000, and schedule of installing power generators was set forward to provide for the first three units on the line by Sept. 1, 1955, and one by Dec. 1, 1955.

The right cofferdam was removed, the left-bank cofferdam was constructed and concrete placed within this coffer and the left abutment during 1952. Also, the right abutment and monoliths in the first half of the spillway were increased considerably. The right-abutment wrap-around fill kept pace with the concrete placing.

Columbia River Constructors were awarded a $39,749,997 contract April 2 for the power house and intake construction. The contractors' aggregate and concrete mixing plants were constructed, finishing excavation was undertaken, and first concrete was placed in the intake structure Sept. 11. The work progressed until suspended for the holidays.

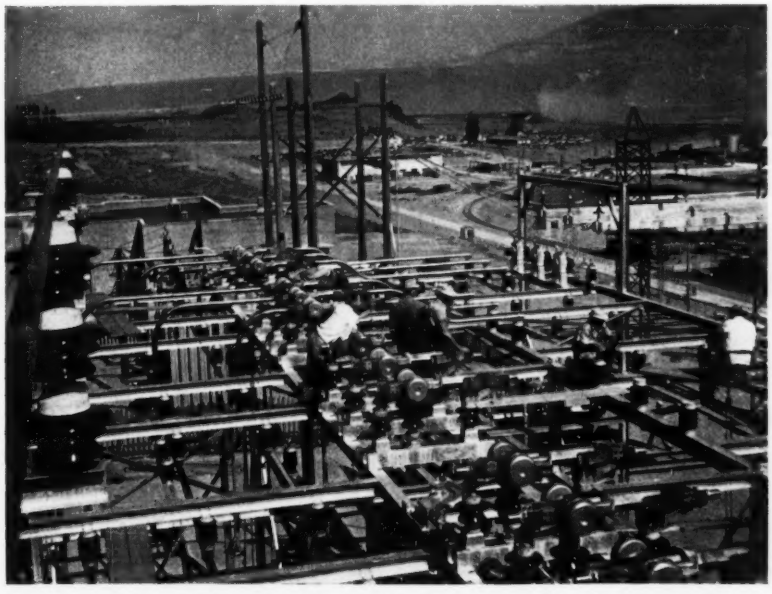
Chief Joseph Builders, contractor for the main dam, suspended concrete work for the winter on Nov. 20, with a total of 643,000 cu yd in place—two-thirds of the job. Removal of the second cofferdam was started in November and is continuing through the winter.

Contracts for procurement of 10 hydraulic turbines and four main-unit generators for Chief Joseph Dam were in force in 1952. Other power house equipment procurement contracts, including 4,160-v switchgear, station-service unit substations, intake gates and intake gantry crane, were awarded during 1952.

Concrete placement in the main dam and the power house and intake structures will proceed through 1953. Monoliths of the dam, which were placed at temporary low elevations to provide for diversion of the river, will be raised. River diversion will be through temporary sluices left in the main dam. Contracts will be awarded in 1953 for six hydraulic turbines, four generators, transformers for 12 units; station-service turbines, governors and generators; intake gate operating machinery, and other power house equipment.

The Chief Joseph generators will have a rated capacity of 64,000 kw. The first 16 units are scheduled to be on the line by the end of 1958. This project is designed to have 27 units ultimately for a total rating of 1,728,000 kw, which will be second only to Grand Coulee Dam, the world leader, which is 51 miles upstream.

Expenditures for Chief Joseph Dam during fiscal year 1952 totaled $15,009,000; the appropriation for fiscal year 1953 is $14,903,000.



Completing switchrack for take-off to new Wenatchee plant of Aluminum Co. of America

Clark County PUD

The Clark County Public Utility District ended 1952 with 29,350 customers, a gain of 293 over 1951. During the year work crews continued its county-wide system rehabilitation program. This was the fifth year of the program started in 1948 when properties of Pacific Power & Light Co. were purchased.

During the year 2,300 poles were set, bringing to 12,879 the total installed since March 1948. This is about 40% of the poles in the system.

Replacements and additions of distribution transformers resulted in a net increase of 5,800 kva. During the year two banks of step regulators were installed to give better service to the east Vancouver and northwest Clark County areas.

Seventy-six miles of distribution lines were rebuilt, with 24 miles of that being both rebuilt and converted from 2,400 to 7,200/12,450 v. Another 32 miles were converted to the higher voltage. Ten miles of line extensions were constructed that will ultimately serve 226 new customers. Automatic reclosing switches were installed at several points in the system.

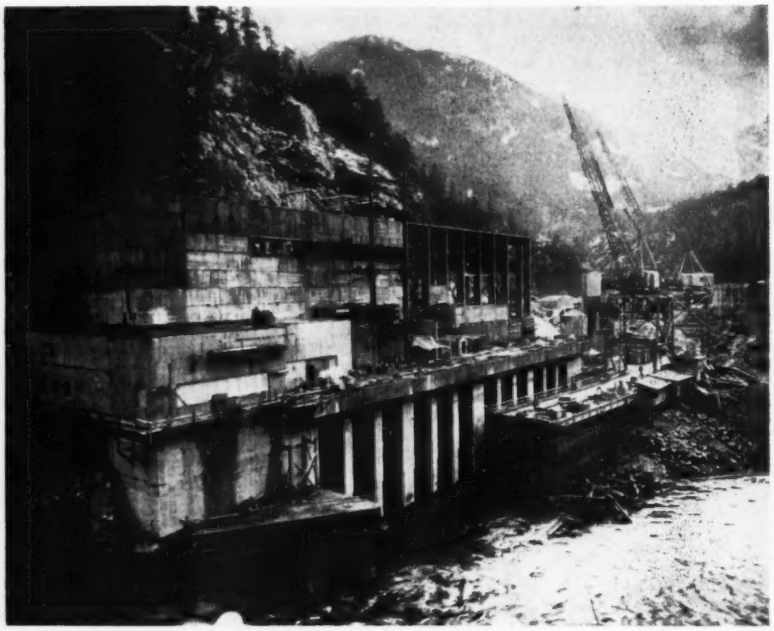
During the year the street lighting systems of four cities served by the system were revamped. In Vancouver a modern incandescent luminaire was installed at every intersection in the residential area. Mercury-vapor lights were installed along all major thoroughfares and at each four-way stop. Eighteen mercury-vapor lights were installed in the commercial area of Washougal and 16 in Ridgefield. Twenty-seven incandescent lights were added to Battle Ground's system.

In 1953 the utility expects to continue its improvement and rehabilitation program. Bids will be called early in the year for construction of a two-story office building to be built in Vancouver. The pole replacement program will be continued, with 2,000 new poles scheduled to be set. Line rebuilding, conversion and extension will be continued.—*V. M. Cleaveland, manager.*

Columbia Basin Project, USBR

Two of the Grand Coulee pumping plant's 1,350-cfs pumps were placed in operation during the 1952 irrigation season, making possible the first large-scale delivery of water on the Columbia Basin Project in Washington. Installation of two additional pumping units is essentially completed. Work is proceeding on installation of the motors and pumps for two more units. (The ultimate installation at Grand Coulee will consist of 12 pumping units.)

Construction continues on other pumping installations for the project's irrigation system. The two Lake Lenore pumping plants are virtually finished. The Babcock pumping plant, 292 cfs capacity, is about 85% completed and the Ringold pumping plant, 236 cfs capacity, is more than half finished. Construction of the Upper and Lower Scootenay pumping plants is near completion, and the Lower and Upper Saddle Gap pumping plants are about two-thirds finished. The Quincy pumping plant structure was completed in July and installation of the 350-cfs-capacity pumps was completed the following month. Construction of the 135-cfs-capacity Warden pumping plant is planned to start in the spring of 1953. The 13.2-kv transmission lines, 11 miles long, for the Ringold and Babcock pumping plants are virtually completed.



One 90,000-kw unit was completed in Ross power house last year by Seattle City Light

Cowlitz County PUD

During 1952 the district reconstructed and rerouted approximately three miles of 69-kv transmission line in the Longview-Kelso area. This was occasioned by the need for a heavier line between the Kelso and West Kelso substations, together with the rerouting of a section of existing line to allow for a new 115-kv BPA line to enter the Cowlitz substation.

Additional 69/7.2/12.5-kv substation construction was carried forward to the completion of a 3,750-kva substation at Kalama; a 2,000-kva substation at Carrolls, about four miles south of Longview; and a 3,750-kva substation at west Longview.

Distribution extensions and improvements were continued to meet the requirements of a very gratifying load growth, and to continue the program of brushing, pole treatment and pole replacements, and also the conversion to a system distribution voltage of 7.2/12.5 kv from 2.4 kv.

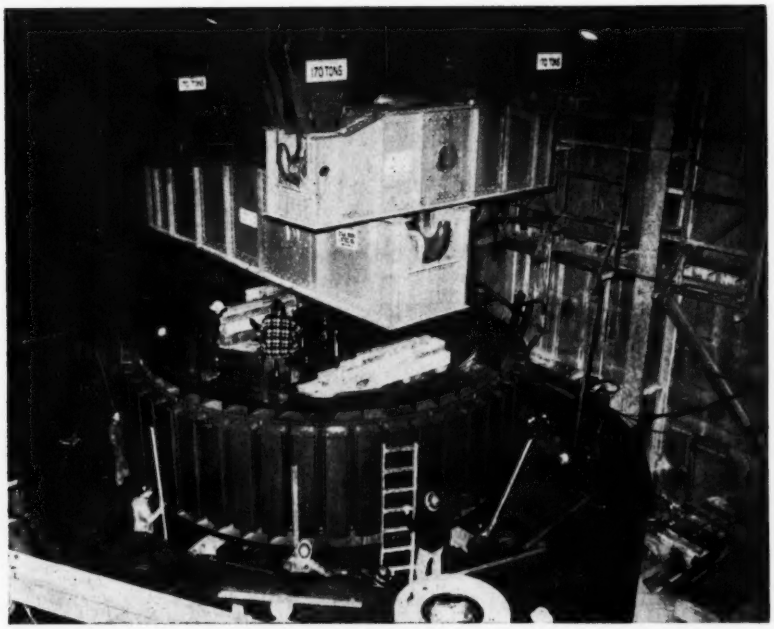
Generating plant improvements were not extensive, being confined to installation of a closed-type cooler for one generator and level control valves in the boiler feed system.

General improvements consisted of the final installation of IBM accounting and billing equipment, and erection of an addition to the general warehouse for transformer storage, maintenance and repair.

In 1953 the program as now outlined includes the reconstruction of one, and possibly two, boiler settings from hog fuel burning to combination oil and hog fuel, including forced-draft and draft-control equipment.

Approximately 10,500 kva of 69/12.5-kv substation capacity is planned to care for load growth in the Kelso-Longview area. An additional 69-kv line of approximately three miles in length is planned to extend from the

Longview BPA substation to a point in west Longview, where it is necessary to provide for load growth and the relief of existing substations. This portion of 69-kv line will be another step toward a 69-kv loop generally surrounding the Kelso-Longview area. 1953 will see a continuance of distribution voltage conversion from 2.4 kv to 7.2/12.5 kv in the Kelso-Longview vicinity, and a similar continuance of the program of pole replacements throughout the system. An important line extension east of Castle Rock, toward Mt. St. Helens, is planned to serve Camp Baker, a relatively large and permanent logging camp, and tributary rural areas. Likewise, a considerable amount of line extension and enlargement will be required to serve a rapidly developing irrigation load in Cowlitz County.—*O. H. Hittle, manager.*



Triangulated support permitted close control in placing 90,000-kw rotor at Ross plant

Puget Sound Power & Light

During 1952 one new 40,000-kva transmission substation and seven new distribution substations with 18,500 kva transformer capacity were constructed. Transformer capacity in ten substations was increased by 19,000 kva. Two distribution substations with 15,000 kva transformer capacity were retired, making net additions during 1952 of 62,500 kva. Of $5,000,000 spent on plant accounts during 1952, $4,110,000 were for distribution and $600,000 for transmission. The balance was for hydro and steam stations and other miscellaneous accounts.

During 1953 we plan to install a new 40,000-kva transformer bank with associated switching equipment at our Bellingham transmission substation. Four new distribution substations with a total capacity of 16,000 kva will be built and the capacity of three distribution substations will be increased by a total of 4,000 kva. Of the $5,500,000 budget for plant accounts during 1953, $4,424,000 is marked for distribution, $700,000 for transmission, and the balance for generating stations and miscellaneous accounts.—*Frank McLaughlin, president.*

Seattle City Light

During the year 1952 the total expenditure for additions to plant amounted to $29,755,000. The Ross hydro station accounted for $19,650,000 and additions to the Diablo and Gorge projects brought the total hydro plant expenditure up to $21,225,000. The additions to transmission plant amounted to $5,350,000; distribution plant, $2,700,000; and general plant facilities, $480,000.

Construction continued on the Ross power plant to the point where the first generating unit of 90,000 kw capacity was brought into service on Dec. 30.

Construction of new housing and community facilities to take care of the Ross and Diablo power plant personnel was partially completed during the year. These facilities are located at Reflector Bar near the Diablo plant.

The new double-circuit 230-kv steel-tower transmission line extending from the Ross plant to the Bothell receiving station was completed. Approximately 20 miles (40 circuit miles) of this line were built in 1952, the remaining 70 miles having been completed in 1951. Altogether 13 miles of 26-kv line; 3.7 miles of single-circuit 115-kv wood-pole line; and 20 miles of double-circuit 230-kv steel-tower line were completed in 1952. A 62,500-kva (maximum rating) transformer bank was placed in service at the North receiving station and 75,000 kva of distribution station capacity were installed during the year.

The number of meters in service increased to 237,980 at the end of 1952 compared with 233,253 at the end of 1951, an increase of 2.03%. The net system energy in 1952 increased 3.26% over that of 1951. The 1952 net system peak demand was 551,000 kw as compared with 537,000 kw in 1952, an increase of 2.6%. Annual system load factor for 1952 was 54.17% compared with 49.65% in 1951. The energy and peak loads for the system were reduced to some extent by reason of the Northwest area power shortage which resulted in a program of voluntary curtailment along with an enforced curtailment on the part of customers using in excess of 8,000 kwh per week.

1953 Plans

Plans for the expansion of the department's facilities during 1953 include completion of the power plant, tunnels and intake and installation of two additional generating units of 90,000 kw each at the Ross plant. This will bring the total capacity of the Ross plant up to 270,000 kw. A relatively minor amount of transmission plant is planned for completion, which includes the addition of 62,500 kva of receiving station capacity.

Plans for the distribution system include installation of 75,000 kva of substation transformation along with the necessary line work required to integrate the facilities acquired from the Puget Sound Power & Light Co. in 1951 with the department's original facilities. New extensions are expected to be about the same as the past year. This work will receive the expenditure of approximately $20,700,000 of which $16,700,000 will be for hydro development, $550,000 for transmission system, $2,950,000 for

distribution facilities, and $500,000 for general plant additions.—*E. R. Hoffman, superintendent of lighting.*

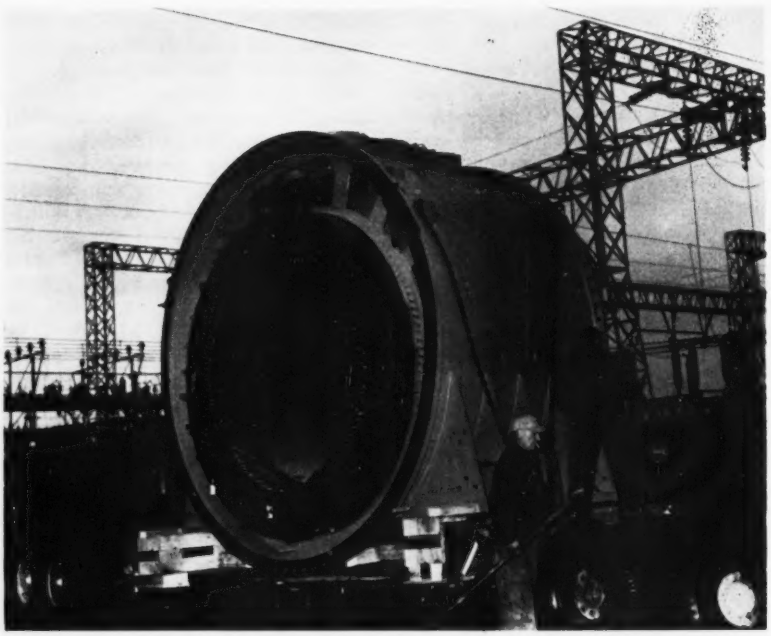
Tacoma City Light

Another year of delay in the courts, occasioned by active opposition of the fish interests, has prevented the start of construction of Tacoma's proposed 460,000-kw hydro development on the Cowlitz River. Had Tacoma been allowed to proceed on schedule with this development, the current power shortage now plaguing the west group of the Northwest Power Pool could have been averted. Northwest firm power loads could then have been carried until additional federal and nonfederal generating plant construction had been completed.

During 1952 Tacoma City Light added a 27,000-kw name-plate-rated generating unit in Cushman power plant No. 2 on the Skokomish River near Potlatch, Wash. This utility now has 238,000 kw of hydro and 34,000 kw of steam generation, having an aggregate name-plate rating of 272,000 kw.

Construction is nearing completion on a major 230/115/52.5-kv receiving substation to serve as terminus for a 230-kv interconnection with the Bonneville Power Administration, replacing the present two 110-kv interconnections with BPA at Tacoma's Tideflats substation. Ultimately this new substation, currently referred to as the Cowlitz substation, will be the terminus for the Seattle-Tacoma interconnection at 230 kv, and for the 230-kv lines from the Cowlitz River project when that development is constructed. Also terminating at Cowlitz substation will be 115-kv lines from Tacoma's Nisqually and Skokomish River developments. A 40,000-kva synchronous condenser is being installed on the site, with plans for an additional 40,000-kva synchronous unit or capacitor bank in the future.

Gross generated and received power during 1952 amounted to 1,551,561,000 kwh, an increase of 4.23% over 1951. Peak for the year was 267,000 kw.—*J. Frank Ward, superintendent light division.*



Stator for 27,000-kw unit installed in 1952 in Cushman plant No. 2 of Tacoma City Light

Construction work in connection with installation of 27,000-kw unit at Cushman No. 2

Washington Water Power

The largest annual construction program ever undertaken by the Washington Water Power Co. was carried out successfully during 1952, calling for an outlay of $31,270,000. Of this amount, $27,773,000 went into building the firm's new Cabinet Gorge hydroelectric development on the Clark Fork River in northern Idaho, and $3,497,000 went for expansion of general service.

WWP has budgeted $7,700,000 for 1953, with $3,700,000 of it earmarked for new and improved service facilities in its present system, and the remaining sum set aside for completion of the Cabinet Gorge project.

1952 was a banner year for the Northwest utility, seeing the company return to the status of an independent operating company with the distribution of American Power & Light Co. common stock, and the initial production of power from the new project at Cabinet Gorge — Idaho's largest hydroelectric project.

On Sept. 29, just 21 months after start of construction of the $46,000,000 project, the first of the plant's

Lowering rotor of second 50,000-kw unit at Cabinet Gorge of Washington Water Power

Prototype of 230-kv pipe-type submarine cable planned by Bonneville Power Administration

four 50,000-kw generators began operating at more than rated capacity (63,000 kw during October and November).

The second unit went into production Nov. 29. Earlier in the year a crew of 1,700 men had worked around the clock to complete the 208-ft-high dam, finishing the job in a dramatic race with time and the river only hours before the Clark Fork topped the spillway in spring flood. Morrison-Knudsen Co. Inc. of Boise, Idaho, was prime contractor.

Meantime the company saw completion of its 230-kv transmission line from Cabinet Gorge to Spokane, and installation of the largest autotransformer ever built by General Electric Co. to step the new power down to 110,000 v for interconnection with the WWP system at Beacon substation, and with the Northwest Power Pool.

The immense 125,000-kva transformer, measuring 24 ft high, 31 ft long and 17 ft wide, weighs 230 tons. It is the largest of its type in service in the Northwest. A twin unit will be installed early in 1953.

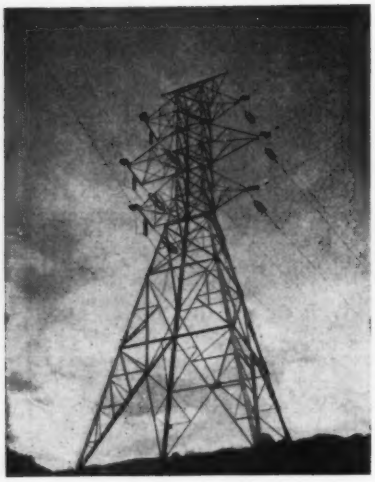
Elsewhere around the system other crews were busy expanding and improving service to the company's 120,000 customers in Washington and Idaho.

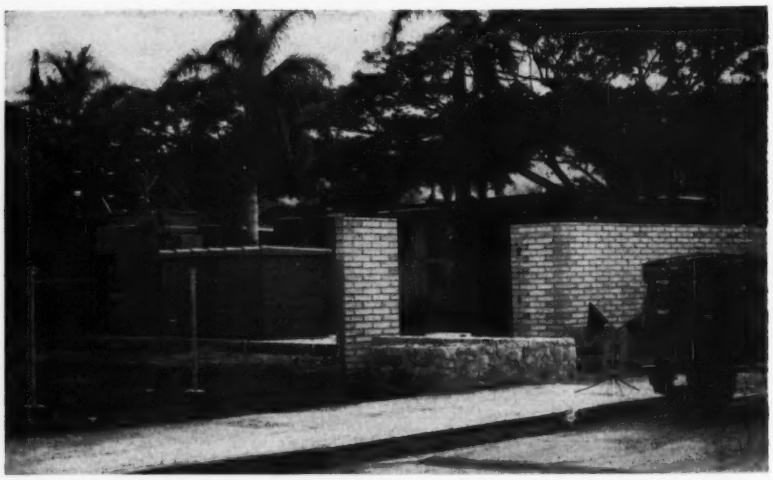
With the Cabinet project accounting for the bulk of it, 202,500 kva of transmission substation transformer capacity were added, and another 70,945 kva of distribution capacity installed. Some 85 miles of transmission lines were built, 80 miles of which were the Cabinet-Spokane line, and another 43 miles of line between Moscow and Orofino, Idaho, reinsulated from 60,000 to 110,000 v. Approximately 103 miles of distribution lines, including 50 miles of rural lines, were added to the system. New distribution lines included 10 miles of 33,000-v line to furnish power to mining and milling operations reactivated in northern Stevens County, Wash., by the American Smelting & Refining Co.

Also during the year new substations were built at Juliaetta, Idaho (110/13 kv), Orofino, Idaho (110/60 kv), and near Evans, Wash. (33/2.3 kv). Substation capacity was increased at St. Maries and Osburn, Idaho. Three new regulator stations were built in Spokane, and regulating equipment installed at seven other locations. Rebuilding of the Spokane distribution system to 13,000-v operation, and underground expansion, continued. A total of 10,000 kva of capacitors was installed on the distribution system; and interrupting capacity of circuit breakers increased at four major transmission substations. The year saw the completion of a project to install modern circuit breakers and switching gear at the Nine Mile power station on the Spokane River.

As the year ended, the company purchased 13½ acres of close-in industrial site property in Spokane for the purpose of creating a service and storage center for Spokane division operations.

Looking ahead to 1953, the company plans operation of the third generating unit at Cabinet Gorge in February, and the fourth and final unit in July. Cabinet Gorge and its 200,000 kw capacity brings to 12 the number of hydroelectric plants operated by WWP, and doubles its capacity for production.





Steel tower (left) at Boysen Dam, USBR. Right: One of several new unit substations installed last year by the Hawaiian Electric Co.

Engineering studies at Noxon Rapids, Mont., 24 miles upstream from Cabinet Gorge, are now being carried on by WWP to determine feasibility of building the company's thirteenth plant at that point. It is possible that another 300,000 kw could be developed there.

General system construction plans will demand an expenditure of some $3,700,000 in 1953. They include the building of nine new substations, and increasing the capacity of another eight; 110/13-kv, 12,000-kva units will be built in Spokane and the Spokane Valley. A 60/13-kv, 7,500-kva installation will also be made in the Spokane Valley; 110/13-kv, 3,750-kva units will be installed at Orofino and Moscow, Idaho, and at Clarkston and Rosalia, Wash.; 60/13-kv units will be built at Grangeville (2,000-kva), and at Kooskia (1,800-kva), Idaho. Capacity will be increased at the Opportunity substation in the Spokane Valley where cutover from 60 to 110 kv will be made, and at Kamiah and Spirit Lake, Idaho, and Chewelah and Othello, Wash. A project of increasing capacity at a University of Idaho substation in Moscow will be completed during the year. Capacity will also be increased at two other smaller substations, and additions made to the Spokane underground system serving the downtown area.

Voltage regulating equipment will be installed in three substations in Spokane and at eight others in Washington and Idaho. Three generator voltage regulators will be installed at the Little Falls generating station on the Spokane River, and improved oil circuit breakers at a Spokane substation and another in Coeur d'Alene.

Altogether, an addition of 202,500 kva of transmission substation capacity (again the bulk of it due to installation of the third and fourth units at Cabinet Gorge) will be made. Additions of 100,200 kva of distribution substation capacity are planned.

Forty-one miles of new transmission line will be built, 110 kv portions of it linking the new substations in Spokane, and a 27-mile 60-kv circuit from Kamiah to Grangeville, Idaho. Seventy-two miles of new distribution lines will be built, including 20 miles of 13-kv lines in the Othello, Wash., area where Columbia Basin irrigation districts are now being settled.

Among numerous other items of new construction will be the rebuilding of another 200 blocks of distribution lines in Spokane to 13-kv operation.

Yakima Project, USBR

Construction is planned to start next summer on the Chandler power and pumping plant in Washington. The installation will include a 12,000-kw-capacity power plant of two generating units and a 500-cfs-capacity turbine-driven pumping plant having an initial two and an ultimate three 167-cfs-capacity units.

Wyoming

Kendrick Project, USBR

Construction of the Alcova power plant in Wyoming is about 25% completed. The plant will house two 18,000-kw units. Transmission lines completed on the project in 1952 were: Sinclair-Hanna, 26 miles, 34.5 kv; and Seminoe-Bairoil, 36 miles, 34.5 kv.

Missouri River Basin Project, USBR

Placed in operation in 1952 was the project's Boysen power plant, a 15,000-kw installation in Wyoming. Nearing completion is the 50,000-kw Canyon Ferry power plant structure in Montana.

Bids are planned to be invited in January for construction of the Missouri Diversion Dam and the Little Porcupine power plant in Montana. The power plant is to be a three-unit, 18,000-kw-capacity installation. Invitations are expected to be issued in March for construction of the 100-cfs Crow Creek pumping plant, also in Montana.

More than 600 miles of transmission lines were completed on the project in 1952. Major transmission lines completed in North Dakota, South Dakota, Wyoming, and Montana included: Rapid City-Wall-Midland, 115 kv, 109 miles; Brookings-Watertown-Groton, 115 kv, 220 miles; Garrison-Washburn-Bismarck, 230 kv, 60 miles; Bismarck-De Vaul, 69 kv, 43 miles; Fort Randall-Winner, 115 kv, 72 miles; Thermopolis-Lovell, 115 kv, 84 miles; and Glendive-Williston, 115 kv, 92 miles. Erection of the steel towers for the 230-kv, 98-mile-long Bismarck-Dawson-Jamestown line was completed in November. Stringing conductors and overhead ground wires for the line is about 25% completed.

Construction of 127 miles of the 115-kv Sioux Falls-Brookings and Armour-Fort Randall-Gavin's Point lines is virtually finished. The contract for the construction of 173 miles of the Huron-Armour and Gavin's Point-Sioux Falls 115-kv transmission lines is about 80% completed. The Garland-

Lovell, 69-kv, 19-mile-long line in Wyoming was completed in December.

Steel towers are being erected for the Fort Randall-Sioux City line, 230 kv, 122 miles long; bids are to be invited this spring for stringing the conductors and ground wires for this line. Other transmission lines started on the project in 1952 were: Oahe-Midland, 115 kv, 55 miles; Lovell-Yellowtail, 115 kv, 46 miles; Bismarck-Mobridge-Oahe, 230 kv, 167 miles; and Fort Randall-Oahe, 230 kv, 135 miles. In December bids were invited for construction of 160 miles of 115-kv Sinclair-Rock Springs-Westvaco lines in Wyoming.

Alaska

Eklutna Project, USBR

In Alaska, construction of the 30,000-kw Eklutna power plant began in September 1952. The first of the plant's two 15,000-kw generators is planned to be in operation by October 1954; the second is scheduled for January 1955.

The 15-mile-long, 115-kv Eklutna-Palmer transmission line was completed in October. The Eklutna-Anchorage line, 26 miles long, 115 kv, is about 50% completed.

Canada

B. C. Electric

Continued expansion of the electric facilities of the B. C. Electric Co. Ltd. took place in 1952 with an expenditure of approximately $22,500,000. The main item was the completion of the 82,000-hp single-unit Wahleach hydro-generating station, which went into service on Dec. 8.

Both Mainland and Island system loads continued to grow, the Mainland peak increasing from 340,900 kw in December 1951 to 351,600 kw in December 1952. This is in addition to power exported to the Northwest Power Pool. For the same months, the energy generated for use on the Mainland system increased from 146,000,000 to 155,000,000 kwh, an increase of over 6%.

In the metropolitan area of Vancouver no new substations were begun but additions were made to all existing stations to keep abreast of load growth. Major reconstruction of North Vancouver substation was undertaken to receive power at 60 kv instead of 34 kv and to permit increased capacity in later years. In the Fraser Valley, a 3,000-kva transformer was added at Balfour substation and a 6,000-kva substation put into service at Abbotsford. This latter installation permitted the shutting down of the old Matsqui substation. A 60-kv transmission line was extended from Chilliwack to Hope, a distance of some 35 miles, and a 3,000-kva transformer was installed at that point to increase the capacity available in the Hope area. A 12-kv circuit was built from Hope to Yale to supply residents between these two points and to permit the shutting down of the diesel plant there. The same 60-kv line also supplies the new Kent substation built in 1952 near Agassiz to supply that area and relieve the load on Chilliwack substation. A 20-mile 60-kv line was also built from Bridge River generating station to Lillooet and a 3,000-kva transformer was installed to replace the diesel generating units that supplied the area.

One of the major items of expenditure was construction of a high-voltage transmission line from Wahleach to the Vancouver area, a distance of 65 miles. To operate originally at 230 kv, the line is built and insulated for 345-kv operation.

A 1,500-kw mercury arc rectifier was put into service at the new Oakridge rectifier station in Vancouver to supply additional trolley coach load.

No new generating facilities will be installed in 1953 but the output of Buntzen No. 2 plant will be changed from 34 kv to 60 kv and a 60-kv switching station constructed to control the power output of the Buntzen No. 1 and No. 2 plants.

In the Vancouver area, the Dal Grauer substation originally scheduled for 1952 and housing two 20/25-mva 60/12/4-kv transformers will go into service about April 1. The fourth 15/20-mva transformer for Sperling, also scheduled for 1952, will now go into service in early 1953. A 66-mva 230/60/12-kv transformer will be installed at Kidd substation to replace an existing transformer of one-half that capacity. An eight-position 60-kv ring bus will be installed at Barnard. A new 6,000-kva West Bay substation will be built in the West Vancouver area.

In the Fraser Valley, new substations will be built at Maple Ridge with one 3,000-kva transformer, at Delta near Ladner with one 3,000-kva transformer, and at Mission with two 3,000-kva transformers.

Seven 1,500-kw mercury arc rectifiers will go into service in the city of Vancouver—two at Sperling Annex (formerly Point Grey substation), two at Fir St. and one at Newell, all to replace rotating manually controlled equipment; a third unit will be installed at Haro St. and one unit installed in a new station to be built in the vicinity of Joyce Road and Kingsway.

On Vancouver Island, no major installation was undertaken in 1952 but a second 15/20-mva transformer will be installed at Bay St. substation in 1953 and a new Langford substation containing one 3,000-kva 60/12-kv transformer will be completed.

Plans for Vancouver Island as well as the Mainland also include many minor additions and changes for increased and improved service.—*T. Ingledow, vice-president and chief engineer.*

Hawaii

Hawaiian Electric

During 1952, $2,400,000 were expended for new and improved facilities by the Hawaiian Electric Co. Ltd. Included in these improvements were the installation of 4.6 miles of No. 2 copper, 44-kv line from Waimanalo to Koko Head, and a 2,000-kva, 44/4-kv substation at Koko Head; the installation of 5.4 miles of No. 4/0 copper, 44-kv line from Nuuanu Valley through forest reserve area to the upper ends of Manoa and Palolo Valleys to provide a third 44-kv circuit to the east side of the city. A 2,000-kva, 44/4-kv substation was connected to this line in Manoa Valley. Two 44-kv lines were extended to a new substation location in Kapahulu and the first half of a 7,500-kva, 44/4-kv duplex substation was installed. A 2,000-kva, 44/4-kv substation was installed in Aina Haina to supply the underground distribution in this area. The system peak during 1952 was 150.5 mw in comparison with 140 mw in 1951.

Included in the amount of $6,947,000 budgeted for 1953 is commencement of construction of a new power plant in Honolulu and installation of the first unit, a 40/50-mw turbine-generator and a 485,000 pound-per-hour boiler, to be completed in 1954. The installation of three 44-kv low-pressure gas-filled underground cables from the new Honolulu power plant to Iwilei and School St. substations will commence in 1953. These circuits will tie the new generator to the transmission system.—*L. W. Lengnick, executive engineer.*

Distributors, like Sues, Young & Brown, Los Angeles, energize dealer sales effort by sales meetings, instructive and entertaining

HOW TO VISUALIZE THE WEST'S 1953

Equivalent to the building of an entire Southern California Edison Co. system in one year—with all of its power generation, its transmission, its substations, distribution—but more to the point to the contractors, dealers and distributors who sell wiring and equipment and appliances, it means selling the equivalent of all the Edison company's customers' present equipment, wiring and appliances. That in a nutshell is what the market for all the West will total for the year 1953, according to our engineer's estimate of it. It is based on the 1,700,000 kw of generating capacity to be built this year by all utilities, private, municipal and federal. That is about the size of the Edison system. It will take more investment than was required to build the Edison plant. There may not be added in 1953 the million customers that Edison has but every type of load —domestic, commercial, farm and industrial—that Edison serves will be duplicated in total.

That is a way to visualize the total market opportunity. To break it down into the potential for each appliance, for wiring, for lighting and commercial equipment, farm motors and devices, industrial power machinery, requires basic figures from which to derive proportions. As customary the commercial executives of the utilities of the West were asked for such basic information as number of customers served, kwh consumption per average domestic customer and the number of appliances sold in 1952. From these it can be estimated that the sales in 1953 will be about on a par. The single element to disturb any predictions is that of television. Wherever a new station is to be put on the air in 1953 the impact of television set sales at once disturbs the normal selling pattern of other appliances. The effect is unpredictable, except that television set sales boom and those of white goods lag until an initial saturation of about 30 to 40% is achieved, then TV set sales settle down and white goods come back.

In the tables on these pages the data on sales, saturation, customers, etc., are concentrated. Some of them are more recent than those given earlier to *Electrical Merchandising* for its January statistical issue. Brief comments from the utilities tell what promotion and selling help they give to the dealers in their areas. On the whole the industry is selling equipment so vigorously that the utilities are busy trying to keep up with the demand.

Arizona

Arizona PS

The Appliance Merchandisers Assn. in Phoenix is the organization through which sales activities of the entire industry are coordinated and at its Jan. 12 meeting the AMA sales program for year with the slogan "Selling the Key in '53" was announced to the industry by President Jim Donahue of Climate Control Co. and Manager E. W. Cowdry. Outside of the Phoenix area a similar schedule is promoted by the Arizona Public Service in what used to be the Northern Arizona Light & Power Co., now the state division. It likewise carries on promotions in step with the AMA plan.

The program sets up 19 promotions during the year. These are adequate wiring, Jan. 4-17; modern kitchens, Jan. 18-31; Feb. 3 a sales training course will be started; automatic laundries, Feb. 1-28; evaporative and refrigerated air conditioning, March 1-28; advertising for the appliance show, March 29 to April 11, the appliance show itself April 9-12; refrigerators and freezers, April 13 to May 2;

Even small homes, such as by Basin Builders, Los Angeles, have all-electric kitchens

MARKET OPPORTUNITY

electric housewares, May 3-9; electric ranges, May 10 to June 6; air conditioning again, June 7-27; refrigerators and freezers, June 28 to Aug. 1; institutional advertising, Aug. 7-15; adequate wiring again, Aug. 16-29; television, Aug. 30 to Oct. 10, with a big television exposition Sept. 25-27; heating, Oct. 11-31; gas ranges, Nov. 1-28; and housewares and traffic appliances for the holiday season, Nov. 29 to Dec. 24.

In addition, an all-day sales forum of the Pacific Coast Electrical Assn. will be held on March 17.

California

Alameda PU Dept.

A dealers' cooperative load-building plan was inaugurated last February, under which dealers with business establishments in Alameda who display and sell ranges can offer customers wiring for ranges of 7.5 kw or over, storage water heaters of 2.5 kw or over, air heater of 3 kw or over or electric clothes dryer of 3.5 kw or over. The wiring is installed by the Bureau of Electricity and remains its property. The utility engages the contractor. With this program the utility runs advertising around which dealers may run their own ads. The utility pays a third of the ad cost if the ad covers electrical appliances of certain load-building types. The program also details the service responsibility of both dealer and utility, moving of ranges, installation of pigtails, replacement of old ranges. This plan has been in effect with satisfactory results for the past year and will continue.—*G. A. Baxter, general manager.*

Burbank PS Dept.

We will have increased emphasis on electric clothes dryer promotions and a continuation of activity on electric ranges.—*H. E. McComas, new business agent.*

California Electric Power

Our efforts as a utility will be to promote and sell ranges, water heaters, home freezers, laundry equipment and room conditioners.—*D. B. Wheelock, commercial vice-president.*

California-Pacific Utilities

A complete customer service and business development program, which outlines in detail company policy and practices in its 1953 dealer-contractor cooperative sales program, is being published for distribution to all service area associated members of the electrical industry during the first quarter of the year.

Additional information covering the company's growth in number of electric customers and increase in customer use of electricity might be helpful in measuring the growth of electric system loads in the rural areas of our part of the West. These data are in an accompanying table.

The substantial growth in the number of customers is partially due to the acquisition of additional electric

Brownies passing cooking merit badge in Southern California Edison home service center

properties, however, the rest of the company's system has continued to grow at about the same rate as shown for the years of 1950 and 1951. Customer use of electricity is still increasing at a remarkable rate. It will be noted that it equals approximately double the national average for domestic customers.

Dealer appliance sales approximately equal sales for 1951 with units per 100 customers decreasing somewhat as range and water heater domestic customers' saturation goes above the 60% mark. Dealers report substantial stocks and most recent surveys indicate that 1953 major appliance sales will continue at the 1952 rate.

An ambitious 1953 construction program indicates that all operating districts foresee the continuation of a highly satisfactory growth of electric system load.—*E. A. Nickelsen, commercial manager.*

Preparing Fresno dealers for UHF television, Westinghouse Supply had a closed-circuit broadcast over KMJ-TV. John Harvey, Wesco; James Cowan, Hockett-Cowan Music Co.; J. F. Moffett, Buford's; Robert Sloan, Wesco, San Francisco, shown here, were among the many participating in the "dry run" before the station went on the air

Coast Counties G&E

Our company will continue to cooperate with appliance dealers in our service area and will make available to them promotional programs, sponsored by the Northern California Electrical Bureau.

Coast Counties Gas & Electric Co. will continue its nonmerchandising policy and will assist dealers in the sale of appliances by offering display space in our business offices for their appliances.

A series of newspaper advertisements and direct-mail promotional material featuring modern electrical appliances has been planned for 1953.

Our home service counselor will continue to demonstrate electric ranges for dealers when requested for group presentations. Demonstrations featuring the use and care of the electric range will be presented to the home economics classes in the public schools.

This company will continue to cooperate closely with the 4-H Club electric farm and home projects sponsored jointly by the Pacific Coast Electrical Assn. and the University of California extension service.—*R. L. Hayden, vice-president and regional manager.*

Imperial Irrigation District

We will continue our program of dealer cooperative promotions, including newspaper and radio advertising, cooking schools and home service work by our home economists. Major promotional work will be on ranges and water heaters, with attention also to freezers, dryers, ironers and air conditioning.—*Paul Post, commercial power superintendent.*

Los Angeles Dept. of W&P

Our plans for 1953 include continued promotion of appliances with favorable load factor and off-peak characteristics, such as the water heater, all-electric laundry with emphasis on the clothes dryer, home freezer, electric bedding and the all-electric kitchen. Our wiring reimbursement of $25 for approved electric water heaters will continue as an important sales aid in the promotion of this appliance.

Anticipating that the local home building boom will continue in 1953,

California-Pacific Utilities Co.

NUMBER OF ELECTRICAL CUSTOMERS (DOMESTIC AND RURAL—TOTAL)

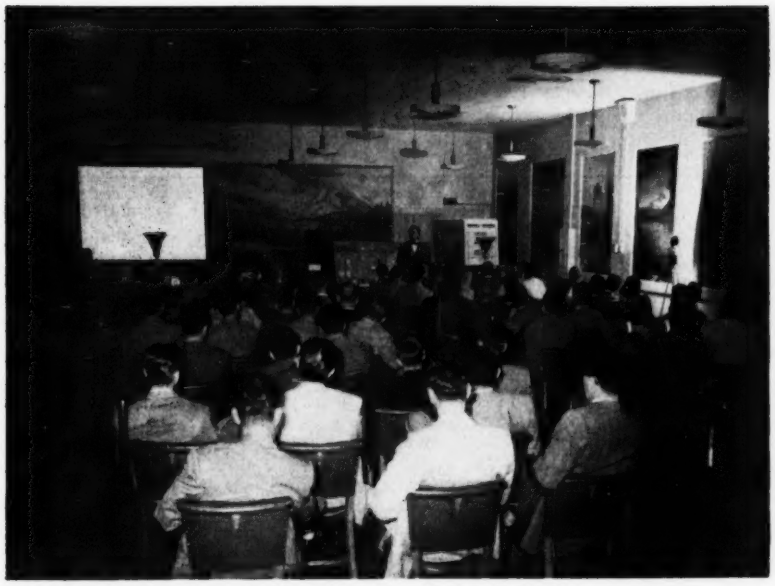
Year Ending	No. of Domestic and Rural Customers	Per Cent Increase	Total Number of Customers	Per Cent Increase
December 1952	22,143	13.7	26,701	12.0
December 1951	19,475	3.0	23,843	2.7
December 1950	18,914	5.1	23,222	4.8
December 1949	17,994	5.4	22,171	3.6
December 1948	17,062	7.2	21,402	5.3
December 1947	15,910	6.7	20,334	7.6
December 1946	14,911	...	18,889	...

AVERAGE ANNUAL USE OF ELECTRICITY BY DOMESTIC CUSTOMERS

Year Ending	Annual Kwh per customer	Per Cent Increase
December 1952	4,346	17.9
December 1951	3,687	11.0
December 1950	3,322	11.3
December 1949	2,984	11.6
December 1948	2,675	19.4
December 1947	2,240	27.0
December 1946	1,760	...

DEALER MAJOR ELECTRIC APPLIANCE SALES

Year Ending	Freezers and Refrigerators	Ranges	Water Heaters	Total Units	Units per 100 customers
December 1952	2,243	1,351	1,196	4,716	21.3
December 1951	2,233	1,461	1,117	4,811	24.8
December 1950	3,057	1,779	1,324	6,180	32.9
December 1949	2,032	1,273	1,009	4,314	24.4
Recember 1948	1,779	1,389	1,325	4,493	26.3
December 1947	1,372	1,110	1,300	3,782	23.4



No. California IES ran a lighting course in San Jose, San Francisco and Sacramento

we are planning a realignment of our manpower, which would expand our group of certified adequate wiring specialists contacting prospective home builders and the home building industry groups.

Advertising in trade channel publications and metropolitan newspapers will continue at about the same level as last year. Direct mail to both the public and the trade is being introduced in this year's program.

Our dealer consultants, home economists, architectural planning advisors, display and exhibit personnel, and new construction sales representatives will work as a team with the local electric industry as each sales campaign is launched.—*R. H. Cockfield, business agent—power system.*

Pacific Gas and Electric

Both as a guide to its own program of increasing facilities ahead of the demand and to aid its trade allies in the planning of their own sales effort, the marketing and research section of PG and E makes a thorough study of all economic factors that may have a bearing on the growth of the area it serves. Last year the study was printed and given wide distribution and proved of use to all branches of the industry. This year it has been prepared in similar detail but given less widespread distribution, although it is available to any who can make use of the data contained in it.

Barring a full-scale war the "Outlook for the Year 1953" envisions a promising business year, based on continued growth of population, high construction activity, new commercial and industrial enterprises, high acreage yield of farm crops, high personal income and full employment. In summary the predictions made are:

1. **Population**—Recent information indicates a probable increase of about 3½% or 190,000 in 1953 for the 46 counties comprising northern and central California.

2. **Employment**—Reflecting increased industrial, agricultural and trade activity, the labor force will reach an all-time high, with unemployment at a minimum.

3. **Personal Income**—Full employment and continued competitive wage rates will combine to provide high-level purchasing power.

4. **Agriculture**—Cash farm income in northern and central California will be about $2 billion for 1953, about the same as 1952. Farm marketing should be about 3% over the 1952 figure. Higher production costs and possibly lower prices may reduce the return to the farmer. In this area it is estimated 100,000 acres of new land will be brought into production.

5. **Residential Construction**—Maintaining a seven-year trend some 55,000 new single-family homes and 6,000 new rental units will be ready for occupancy in 1953.

6. **Commercial and Industrial**—Nearly 6,000 new retail outlets will be needed to satisfy the growing market. New shopping centers with some 200 to 300 stores will be completed in 1953. Competition from suburban shopping centers should influence downtown stores to modernize with lighting, air conditioning, electrical equipment.

7. **School Building**—Approximately $5,000,000 in state funds per month will be available for new construction, with a higher percentage going to electrical equipment.

8. **Industrial Growth**—Renewal of shipbuilding as a major industry. Bay area contracts total $47,500,000 for five freighters. Electronic industries are the most rapidly growing in the area. Automotive, cement, chemical, food, beverage, lumber, metals, oil, mining—all show promise of expansions.

9. **Appliances**—Electric dryers, ranges, ironers and television sets will be the leaders in customer demand. It is estimated that 439,580 units of eight major appliances will be sold in 1953 as compared to 411,405 in 1952. Included are: 13,750 room coolers, 33,250 freezers, 9,770 ironers, 20,800 ranges, 85,510 refrigerators, 158,000 TV sets, 62,740 automatic washers.

Pasadena L&P Dept.

We only have information on ranges and water heaters added to the line so cannot give information on any other appliances.—*F. V. Frey, supervisor, customer service division.*

Riverside PU Dept.

We plan on one large cooking school this year and hope to be able to do some cooperative advertising with the dealers in the promotion of electrical equipment.—*C. C. Dahlgren, commercial supervisor.*

Sacramento MUD

The district's 1953 budget includes increased allocations for dealer assistance programs. Four major campaigns are scheduled to stimulate the sale of ranges, freezers, home air conditioning and dryers.—*G. L. Cane, director, electrical development.*

San Diego G&E

The San Diego area presents a most favorable market for 1953. New homes are being built at an unprecedented rate. All indications point to a continuation in the immediate future of the high level of business activity that has been enjoyed during the past year. The company's sales promotion plans have been geared to this fast-moving development.

An advertising budget of $166,000 has been set up for promotion of electric sales in 1953. For the most part

this amount will be spent on campaign-type promotions scheduled by months throughout the year. Such campaigns, as well as continuous promotions, will be divided between sponsorship directly by the company and sponsorship by the Bureau of Home Appliances of San Diego County. The latter organization, representing the dealers in this area, will again spearhead those activities aimed at the immediate sale of electrical appliances. Advertising for the purpose of promoting new uses and more specialized applications will go out over the signature of the company.

Adequate wiring will be promoted through the recently organized con-

Appliance Sales

	Domestic Customers	Refrigerators 1952 Sales	Refrigerators % Sat.	Ranges 1952 Sales	Ranges % Sat.	Water Heaters 1952 Sales	Water Heaters % Sat.	Freezers 1952 Sales	Freezers % Sat.	CLM Lamp Sales	Room Conditioners	Washers Automatic	Washers % Sat.	Washers Conventional	Washers % Sat.
ARIZONA															
Arizona PS	99,966	10,594	87	1,366	13	641	5	4,669	7	2,000	441	4,725	30	4,187	50
Salt River Power Dist.	28,750	600	90	250	13	200	20	300	8	500	2,500	250	10	100	40
Tucson GL&P	42,128	...	..	...	..	...	..	...	..	...	...	...	..	...	..
BRITISH COLUMBIA															
B. C. Elec., Vancouver	169,250	28,000	61.5	6,500	32.1	3,750	11.9	2,000	1.8	...	...	2,000	6.7	10,000	77.2
B. C. Elec., Victoria	35,327	5,900	48.5	1,400	31.1	585	12.1	125	-1	...	...	440	5.4	2,212	71.8
CALIFORNIA															
Alameda PU Dept.	13,504	410	80	250	32	8	5	60	10	...	...	205	30	190	55
Anaheim Mun. LP&W	5,625	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Burbank PS Dept	27,924	450	85	275	19	35	2.5	75	7	...	60	325	12	175	65
Calif. Elec. Power	52,500	3,500	90	650	35	350	15	1,500	15	...	...	2,500	50	1,500	50
Calif.-Pacific Utilities	19,569	1,351	65	1,196	25	937	2.5	892	..	...	40	950	..	1,500	..
Coast Counties G&E	35,766	2,225	..	603	13.5	320	3.5	903	..	100	15	1,164	..	1,024	..
Glendale PS Dept.	34,391	...	73.5	430	10	18	4	...	9.7	...	...	...	..	...	..
Imperial Irrig. Dist.	18,896	2,200	90	475	35	190	29	375	6	...	1,500	900	30	1,100	..
Los Angeles Dept. of W&P	612,000	...	89.6	5,000	60.4	2,000	58.7	...	20.4	...	...	...	28	...	68
Modesto Irrig. Dist.	18,466	...	..	...	..	...	..	...	..	...	...	...	..	...	..
PG and E	1,164,500	78,400	77	18,720	15.4	6,580	8.6	30,475	8.1	...	12,850	59,070	78.5**	33,430	..
Palo Alto Elec. Dept.	9,657	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Pasadena L&P Dept.	38,113	...	..	600	13.5	45	3.5	...	..	...	...	...	..	...	..
Riverside PU Dept.	17,050	...	75	652	33.5	50	6	...	..	...	...	...	..	...	..
Sacramento MUD	87,914	8,950	..	2,731	..	661	..	5,824	..	...	...	8,465	..	4,050	..
San Diego G&E	175,000	21,000	13	3,100	..	2,300	11	9,275	..	...	...	14,000	..	9,000	..
Southern Calif. Edison	906,000	47,000	73.5	11,500	10	2,500	4	19,500	9.7	...	5,000	60,000**	..	...	..
Turlock Irrig. Dist.	14,613	...	..	...	..	...	..	...	..	...	...	...	..	...	..
COLORADO															
Fort Collins L&P Dept.	5,090	500	..	400	..	60	..	200	..	500	100	150	..	300	..
Frontier Power	3,660	420	65	65	35	80	9	55	6	...	5	100	10	125	85
Home L&P, Greeley	9,953	567	77	371	68	76	30	39	20	...	...	94	12	96	69
PS of Colorado	178,500	2,815	..	2,728	..	180	..	764	..	10,988	...	...	..	...	..
Southern Colorado Power	34,112	3,265	85	529	22	175	10	451	10	399	100	841	5	1,451	75
HAWAII															
Hawaiian Elec.	68,500	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Hilo Elec. Light	11,130	700	..	500	..	400	..	200	..	...	...	250	..	200	..
Maui Elec.	7,800	300	90	250	43	250	30	100	3	...	...	150	20	100	75
IDAHO															
Idaho Power	99,808	8,500	90	8,000	75	5,000	67	6,000	20	300†	200	5,000	25	3,000	75
MONTANA															
Montana Power	106,635	...	87	4,000	43	1,300	11	...	..	...	...	...	..	...	..
NEVADA															
Caliente PU	382	35	85	20	75	30	75	20	25	...	10	35	15	35	75
Elko-Lamoille Power	1,826	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Ely L&P	1,826	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Sierra Pacific Power	23,953	1,368	..	699	..	449	..	880	..	...	...	...	..	...	..
Southern Nevada Power	12,336	...	..	...	..	...	..	...	..	...	...	...	..	...	..
NEW MEXICO															
PS of N.M., Albuquerque	58,625	5,922	..	1,817	..	288	..	1,270	..	...	...	5,759**	..	...	..
PS of N.M., Deming	1,782	150	..	30	..	9	..	30	..	...	...	30	..	70	..
PS of N.M., Las Vegas	2,991	351	..	80	..	46	..	63	..	...	...	76	..	275	..
Raton PS	2,280	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Southwestern PS (see Texas)		...	..	...	..	...	..	...	..	...	...	...	..	...	..
OREGON															
Calif. Oregon Power	62,712	4,000	..	4,500	64	3,000	58	1,900	..	...	...	1,900	..	2,600	..
Eugene Water & Elec. Bd.	18,300	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Mountain States Power	92,200	...	79	...	52	...	40	...	8	...	...	...	20	...	60
Pacific P&L	101,000	18,200	91	17,200	70	8,700	68	6,500	11	...	...	13,000	24	8,300	70
Portland GE	188,430	...	85	...	71	...	62	...	..	...	...	...	..	...	..
TEXAS															
El Paso Elec.	51,114	6,967	89	1,331	27	1,415	18	1,503	2	...	...	...	..	...	..
Southwestern PS	112,073	15,703	..	2,702	..	470	..	4,391	..	...	...	8,654	..	...	..
UTAH															
Heber L&P Dept.	1,290	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Helper L&P Dept.	850	50	98	50	70	75	70	25	15	...	10	75	25	10	75
Logan Mun. Elec. Light Dept.	4,950	...	..	...	..	...	..	...	..	...	...	...	..	...	..
Payson Elec. Light	1,500	100	75	50	50	50	40	25	10	...	5	25	5	150	90
Provo Dept. of Utilities	7,387	692	..	404	..	126	..	533	..	...	50	523	..	340	..
Southern Utah Power	3,575	...	90	...	40	...	30	...	10	...	...	...	10	...	80
Telluride Power	6,900	250	85	350	80	350	50	250	10	...	...	...	..	...	..
Utah P&L	160,013	9,636	85	7,771	50	4,418	28	7,026	7	14,415‡	...	6,301	20	6,047	69
WASHINGTON															
Grays Harbor PUD No. 1	16,507	...	..	...	60	...	54	...	..	...	...	...	..	...	..
Puget Sound P&L	153,000	...	..	...	79.4	...	72.8	...	..	...	...	...	..	...	..
Seattle Lighting Dept.	182,548	16,500	85	18,800	83	7,440	60	5,200	9	...	...	18,600	20	10,260	70
Tacoma Dept. of PU	49,700	...	..	2,182	..	2,137	..	...	..	...	...	...	..	...	..
Washington Water Power	88,600	8,600	94	8,000	73	4,830	74	3,100	15	2,500	800	5,600	10	5,200	86
WYOMING															
Cheyenne LF&P	11,427	2,200	93	435	32	225	14	300	14	300	50	375	20	1,710	85
Mont.-Dak. Util., Sheridan	4,534	460	96	230	20	22	-1	140	15	...	12	70	12	180	75
Rawlins Elec.	2,550	200	95	300	75	...	5	65	25	...	...	150	20	100	95
Western PS	4,288	550	50	385	22	40	3	190	8	...	5	250	12	400	80

* From Rocky Mountain Electrical League

** Total of automatic and conventional

tractors division of the bureau, plus a continued direct appeal by the company.

Some of the more important campaigns planned for the year are as follows: refrigerators, April to August; home freezers, April to August; bed coverings, January, November and December; laundry equipment, March, September and October; radio and TV, April, July and September; comfort cooling, June to August, throughout the entire area.

Electric ranges and water heaters will be promoted continuously throughout the year in nongas territory, with an intensified campaign in March and September.

Appliance Sales

Ironers 1952 Sales	Ironers % Sat.	Dryers	Vacuum Cleaners	Dishwashers	Waste Disposers	Radio 1952 Sales	Radio % Sat.	Television Sets 1952 Sales	Television Sets % Sat.	No. of Dealers	Utility Merchandises No	Utility Merchandises Yes	
													ARIZONA
369	8	246	...	463	95	12,556	92	12,853	..	300	X		Arizona PS
150	5	100	400	100	200	500	95	500	12	100	X		Salt River Power Dist.
...	..	...	...	...	...	...	..	...	..	40	X		Tucson GL&P
													BRITISH COLUMBIA
350	4.6	300	13,500	175	160	26,500	+100	1,000	1.3	375	X		B. C. Elec., Vancouver
36	3.7	46	1,450	32	14	4,755	+100	500	1.2	107	X		B. C. Elec., Victoria
													CALIFORNIA
60	15	180	210	295	42	510	80	550	40	7	X		Alameda PU Dept.
...	...	...	...	...	...	...	..	...	..	10	X		Anaheim Mun. LP&W
30	10	35	125	30	125	300	85	1,500	60	23	X		Burbank PS Dept.
200	10	200	...	...	...	...	..	...	..	150		X	Calif. Elec. Power
550	..	340	3,600	215	190	...	..	...	..	60	X		Calif.-Pacific Utilities
154	..	283	2,000	128	10	3,290	..	1,578	..	62	X		Coast Counties G&E
...	...	...	...	...	...	...	..	...	74.5	716	X		Glendale PS Dept.
115	8	40	...	...	...	...	..	...	..	46	X		Imperial Irrig. Dist.
...	12	...	...	...	...	...	100	120,000	..	94	X		Los Angeles Dept. of W&P
...	...	...	...	...	...	...	..	2,500	20	40	X		Modesto Irrig. Dist.
8,000	14.8	12,910	21,000	6,380	3,860	92,550	98	150,960	31.2	2,850	X		PG and E
...	..	...	...	...	...	...	..	...	..	...	X		Palo Alto Elec. Dept.
...	..	...	...	...	...	...	..	...	..	62	X		Pasadena L&P Dept.
...	..	...	...	...	...	...	..	...	..	32	X		Riverside PU Dept.
796	..	2,055	2,726	779	666	10,603	..	11,426	..	140	X		Sacramento MUD
3,500	..	2,200	17,000	1,300	6,000	40,000	..	48,000	..	400	X		San Diego G&E
6,500	..	4,000	15,000	3,800	14,000	45,000	..	72,000	74.5	716	X		Southern Calif. Edison
...	..	...	...	...	...	...	..	...	..	...		X	Turlock Irrig. Dist.
													COLORADO
75	..	75	400	200	150	300	..	600	..	...	X		Fort Collins L&P Dept.
25	30	25	85	10	10	305	95	...	..	25	X		Frontier Power
63	39	47	303	50	41	759	87	1,200	10	50	X		Home L&P, Greeley
577	..	521	...	572	437	...	..	115,299*	..	...		X	PS of Colorado
147	4	95	663	134	539	2,561	95	2,250	1	53		X	Southern Colorado Power
													HAWAII
...	..	...	...	...	...	...	..	...	..	150		X	Hawaiian Elec.
50	..	100	...	100	100	...	..	...	..	26	X		Hilo Elec. Light
25	.5	10	150	30	25	125	95	...	..	16	X	X	Maui Elec.
													IDAHO
6,000	20	2,500	2,200	600	400	12,521	95	...	..	600		Ltd.	Idaho Power
													MONTANA
...	..	...	...	...	...	...	..	...	..	696	X		Montana Power
													NEVADA
10	5	10	25	10	5	650	85	...	..	3	X		Caliente PU
...	...	...	...	...	...	...	..	...	..	...	X		Elko-Lamoille Power
...	...	...	...	...	...	...	..	...	..	9	X		Ely L&P
...	...	...	...	...	...	...	..	...	..	125	X		Sierra Pacific Power
...	...	...	...	...	...	...	..	...	..	22	X		Southern Nevada Power
													NEW MEXICO
351	..	161	...	264	125	...	..	...	..	...	X		PS of N.M., Albuquerque
12	..	2	75	18	5	300	..	25	..	...	X		PS of N.M., Deming
22	..	7	...	2	1	...	..	...	..	...	X		PS of N.M., Las Vegas
...	...	...	...	...	...	...	..	...	..	10	X		Raton PS
...	...	...	...	...	...	...	..	...	..	...			Southwestern PS (see Texas)
													OREGON
...	...	...	...	...	...	...	..	...	..	170	X		Calif. Oregon Power
...	...	...	...	...	...	...	..	...	..	...	X		Eugene Water & Elec. Bd.
...	9	...	...	...	...	...	98	...	..	169	X		Mountain States Power
2,100	..	5,500	10,000	1,400	385	35,000	98	15,000	..	475	X		Pacific P&L
...	...	...	...	...	...	...	..	...	..	273	X		Portland GE
													TEXAS
...	...	...	...	...	...	...	..	12,225	..	96		X	El Paso Elec.
970	..	582	...	...	...	...	..	...	..	600	X		Southwestern PS
													UTAH
...	...	...	...	...	...	...	..	...	..	6	X		Heber L&P Dept.
25	20	50	25	4	5	60	99	...	..	5	X		Helper L&P Dept.
...	...	...	...	...	...	...	..	...	..	...			Logan Mun. Elec. Light Dept.
15	10	10	200	20	10	200	90	75	5	5	X		Payson Elec. Light
102	..	146	...	29	28	844	..	1,598	..	29	X		Provo Dept. Utilities
...	30	...	...	...	5	50	95	150	30	12	X		Southern Utah Power
...	...	...	...	...	...	...	..	...	..	24	X		Telluride Power
1,707	9	2,227	10,458	618	514	14,700	99	11,802	45	675	X		Utah P&L
													WASHINGTON
...	...	...	...	...	...	...	..	...	..	100	X		Grays Harbor PUD No. 1
...	...	...	...	...	...	...	..	...	..	175	X		Puget Sound P&L
...	...	...	...	...	...	...	100	85,000	33	300	X		Seattle Lighting Dept.
...	...	...	...	...	...	...	..	...	..	...	X		Tacoma Dept. of PU
850	18	3,500	5,100	770	300	16,110	98	5,500	..	410	X		Washington Water Power
													WYOMING
230	17	300	700	200	100	3,500	95	1,150	-1	24		X	Cheyenne LF&P
28	8	34	92	31	11	240	95	...	..	24		X	Mont.-Dak. Util., Sheridan
50	20	100	40	15	15	150	95	...	..	8		X	Rawlins Elec.
60	9	125	255	40	35	475	150	6	..	17		X	Western PS

† Company only ‡ Includes all types

Home lighting will come in for a greater promotional effort throughout the year as will the sale of traffic appliances.

While these plans contemplate the expenditure of an amount in excess of last year's budget it is, as indicated previously, proportionate to the increasing market for electric service.—*H. G. Dillin, vice-president in charge of sales.*

Southern California Edison

In 1953 our program is a projection of our activities for 1952, with special emphasis on the adequate wiring in the domestic field, and commercial cooking and commercial lighting in the industrial field. We are carrying over a substantial backlog of business under negotiation into the new year in all categories, especially industrial power and residential construction—enough business, in fact, to carry us well into 1953 without any anticipated change in the pace.—*H. C. Rice, director of sales.*

Colorado

Public Service of Colorado

We merchandise ranges, water heaters, dishwashers, disposals, food freezers, ironers, certified lamps, clothes dryers and electric bedding. This year we plan to promote home light conditioning aggressively.—*G. B. Buck, vice-president.*

Southern Colorado Power

We plan range, water heater, dryer, dishwasher-sink, disposal and home lighting campaigns this year. TV just hit in November and at present has upset the normal market conditions on white goods; however continued home building in time, we believe, will bring it back if the proper efforts are made.—*E. H. Pemberton, general sales manager.*

New Mexico

Public Service of N. M.

We only cooperate with dealers and do not merchandise. Not all dealers report sales to us, so our figures may be quite low.—*W. G. Southard, division manager, Deming.*

4-H window by club leaders in Idaho Power Co., Ontario, Ore., window—one of many

We cooperate with dealers all possible. Home service girl is available and we offer a subsidy on wiring of range and water heater.—*Elmer L. Kaemper, superintendent, Las Vegas division.*

Oregon

Pacific Power & Light

Emerging from one power shortage briefly and prior to this winter's renewed shortage, Pacific Power & Light Co. made initial steps toward future load building activities. "Current Plugs," a monthly report of electrical equipment sales by dealers from all the trade centers served by the company in Washington and Oregon, was resumed.

A survey of appliance saturations was also made in the Yakima area to determine the age of appliances in use, the saturations, purchasing intentions and other market data on which to base future cooperative dealer campaigns.

Texas

El Paso Electric

The local dealers started selling TV sets in September and telecasting from KROD-TV started Dec. 11, 1952, and KTSM-TV on Jan. 4, 1953.

The TV sales in this area have been

Compact matched counter cooking equipment at Mel's in Fallbrook is all-electric clean

All-electric apartments in Portland, one of several such new buildings recently

constant and we do not contemplate any big rush in the future. The following is a list of TV sales by months: September 1952, 648 sets; October, 2,794; November, 3,315 December, 5,468; total, 12,225 sets.—*Franklin C. Quinn, dealer counselor.*

Utah

Provo Dept. of Utilities

This year the Provo Department of Utilities in conjunction with the Intermountain Electrical Assn. is actively sponsoring the Adequate Wiring program and calling on every home builder to tell the value of certification. The first home to receive a certificate is shown on the cover. In it are George E. Larsen, Provo utility sales representative; John L. Peterson, contractor; D. Spencer Grow, owner, and John Fisher, electrical inspector. The house has more wire and circuits than any in Provo.

Telluride Power

We plan stepped up and more closely coordinated cooperation with dealers.—*W. O. Cluff, sales manager.*

Utah Power & Light
Western Colorado Power

We are looking forward to 1953 as a very satisfactory year. Our annual business development program has been developed on the theme of "Tell Electric—Sell Electric," and the program will be our basis for a series of industry-wide meetings, both with our own employees and with the rest of the electrical industry.—*W. A. Huckins, manager, business development department.*

Washington

Clark County PUD

A $50 subsidy toward the wiring of an electric range and water heater or $25 for either, where some other form of fuel has been used other than electricity, was instituted last July by Clark County Public Utility District, serving Vancouver, Wash., area. In August the PUD eliminated the demand charge on residential loads under 21 kw and the demand charge on other loads from $1.14 to $1.

Puget Sound Power & Light

Because of local and state conditions, load building has not been promoted.—*Pat Johnson, vice-president.*

Seattle City Light

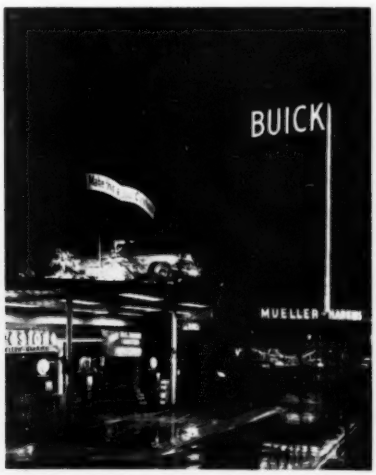
We will renew offer of our recent residential program. Also we will continue our promotion of commercial electric cooking and water heating. In the year 1952, 2,300 kw of commercial cooking were added and 1,900 kw of commercial water heating.—*J. D. Gawne, electric sales supervisor.*

Seattle City Light's program for range and water heating wiring, allowing a total of $55 for both is as follows. Allowance is made for the rewiring of a 110-v, 2-wire service to a 240-v, 3-wire service to accommodate an electric range and an electric water heater, providing both are installed immediately, and the water heater is 50-gal capacity or more. For a range only the allowance is $30. For the water heater $25. Likewise, an allowance of $25 is being made for the installation of an automatic water heater of 50 gal or over, where it replaces an electric sidearm heater. The sidearm heater must be turned over by the dealer to City Light.

Tacoma City Light

Normal sidearm water heater replacement program will be continued and also cooperative programming with appliance dealers is expected to continue during 1953.—*J. Frank Ward, superintendent.*

Lighting course conducted in So. Colorado Power's new office auditorium in Pueblo



Lighting for auto agency in Tacoma, Wash.

Washington Water Power

Our present plans are to promote the sale of merchandise through our established dealers.—*Louis C. Aston, business development assistant.*

Chief promotional source in the Washington Water Power territory is the Inland Empire Electrical League, to which the utility company also belongs. It is an organization of dealers and distributors, whose broad program brings promotion to appliances, television, commercial lighting, air conditioning, adequate wiring. It has three divisions—an appliance division, a radio-television division, and a supplies and equipment division. President is Maage LaCounte of Columbia Mfg. Co.'s distributing branch.

The appliance section's activities in 1952 centered on monthly industry-wide campaigns consisting of league advertising and mass product advertizing by member distributors, dealers and manufacturers. Sales training, display suggestions, point-of-sale tie-in materials, direct-mail suggestions and extensive publicity about advertised products in over 30 newspapers were among the league's follow-through activities. In June an electric food preparation campaign for ranges and electric housewares resulted in a 6% gain over 1951 in area range sales, contrasted with a sales slump of all household electrical products of 11% from the previous June. Through May, range sales were off 18% from the same period in 1951. A campaign in July and August featuring refrigerators, freezers and room air conditioners was titled "Operation Chill." It resulted in freezer sales in July of 35% over 1951, although June freezer

Customers and Consumption

Utility Territory	Average Annual Kwh, Residential					Domestic		Commercial		Total, All Classes	
	1952	1951	1950	1949	1948	1952	1951	1952	1951	1952	1951
Alameda PU Dept.	1,958	1,550	1,690	1,624	1,556	13,504	13,300	1,805	1,790	15,309	14,922
Anaheim Mun. LP&W	2,600	....	1,500	1,000	....	5,625	5,137	1,160	1,130	6,785	6,267
Arizona PS†	2,262	2,038	1,867	1,950	1,811	99,966	95,122	20,067	18,941	120,281	114,294
Ashlund Mun. L&P Dept.	....	....	....	....	3,960	....	....	....	....	....	....
B. C. Elec., Vancouver	2,780	2,575	2,360	2,056	1,810	169,250	163,492	27,100	26,012	200,500	193,486
B. C. Elec., Victoria	2,453	2,210	1,993	1,530	1,500	35,327	34,490	6,032	5,792	41,359	40,482
Burbank PS Dept.	1,940	1,758	1,740	1,732	1,591	27,924	26,534	4,775	4,359	32,699	30,893
Caliente PU	4,800	4,771	....	4,000	....	382	375	41	40	423	415
Calif. Elec. Power	2,025	1,820	1,750	1,840	1,720	52,500	48,060	9,900	9,236	68,500	63,178
Calif. Oregon Power	7,055	5,455	4,920	4,700	3,975	62,712	60,675	14,199	15,468	76,911	76,143
Calif.-Pacific Utilities	4,346	3,687	3,322	2,984	2,675	19,569	17,026	4,486	4,339	26,701	23,843
Cheyenne LF&P	1,954	1,954	1,400	1,800	1,505	11,427	10,218	1,637	1,130	13,064	11,348
Coast Counties G&E	2,330	2,050	1,870	1,710	1,461	35,766	34,812	5,850	5,750	44,752	43,602
Colorado Central Power	1,874	....	....	....	1,400	17,500	16,277	.....	.....	.....	.....
Colorado Springs PU Dept.	....	1,650	....	1,500	....	.....	19,800	.....	.....	.....	.....
Colorado Utilities	....	1,650	1,450	1,350	....	.....	1,800	.....	.....	.....	.....
Elko-Lamoille Power	1,625	1,775	....	....	....	1,826	1,778	579	601	2,405	2,379
El Paso Elec.	2,200	1,887	....	1,830	1,680	51,614	48,993	7,575	7,332	59,878	57,035
Ely L&P	1,342	1,265	1,524	1,337	950	1,377	1,329	315	313	1,692	1,642
Eugene Water & Elec. Bd.	7,000	6,200	6,200	5,800	5,200	18,300	17,632	3,260	3,143	21,560	20,775
Fort Collins L&P Dept.	1,800	2,480	1,980	1,586	1,510	5,090	5,030	1,170	1,040	6,260	6,170
Frontier Power	1,300	1,200	1,080	950	880	3,660	3,609	476	485	4,136	4,094
Glendale PS Dept.	1,750	1,575	1,600	1,500	1,500	34,391	33,409	5,109	4,996	39,500	38,405
Grays Harbor PUD No. 1	5,118	4,474	4,368	3,746	2,301	16,507	16,157	3,664	3,526	20,171	19,683
Hawaiian Elec.	3,060	2,855	2,690	2,570	2,400	68,500	65,683	15,000	....	83,500	....
Heber L&P Dept.	3,400	4,160	3,500	2,600	....	1,290	1,298	132	132	1,422	1,430
Helper L&P Dept.	3,600	2,400	3,600	....	1,500	850	825	.....	.....	.....	.....
Hilo Elec. Light	2,110	1,925	1,835	1,618	1,400	11,130	11,122	277	2,807	11,407	13,929
Home L&P, Greeley	2,500	2,450	2,785	....	2,020	9,253	9,671	2,057	1,994	12,663	12,266
Idaho Power	5,277	4,908	4,580	4,250	3,815	99,808	98,551	14,593	14,003	114,401	112,554
Imperial Irrig. Dist.	4,450	4,000	3,800	3,500	3,400	18,896	18,063	3,661	3,473	27,682	26,594
Logan Mun. Elec. Light Dept.	3,400	3,830	2,700	1,600	2,540	4,950	5,053	....	....	.....	.....
Los Angeles Dept. of W&P	1,785	1,650	1,620	1,648	1,505	612,000	587,428	124,000	122,517	736,000	709,945
Modesto Irrig. Dist.	2,700	.....	2,598	2,400	2,400	18,466	17,441	3,642	3,500	22,108	20,941
Mont.-Dak. Utilities, Sheridan	1,395	1,578	1,500	1,465	....	4,534	4,340	.....	814	.....	5,682
Montana Power	2,515	2,340	2,155	1,955	1,670	106,635	103,697	15,935	15,450	125,430	121,852
Mountain States Power	4,350	3,925	3,635	3,375	3,000	92,200	89,557	17,050	16,625	109,760	106,691
PG and E	2,230	2,031	1,905	1,830	1,620	1,164,500	1,114,502	235,000	229,038	1,462,675	1,402,675
Pacific P&L	5,360	4,960	4,698	4,355	3,920	101,000	98,998	22,090	24,914	150,000	146,320
Palo Alto City Elec. Dept.	....	1,783	1,701	1,639	1,500	....	9,213	.....	1,731	.....	10,944
Pasadena L&P Dept.	1,820	1,732	1,690	1,635	1,590	38,113	37,118	5,979	5,870	44,092	42,988
Payson Elec. Light	5,000	3,040	....	1,200	2,500	1,500	1,500	.....	.....	.....	.....
Portland GE	5,966	5,543	5,344	5,004	4,553	188,430	186,541	24,975	24,303	214,616	212,032
Price Light Dept.	....	5,000	3,600	....	3,600	.....	2,000	.....	.....	.....	.....
Provo Dept. of Utilities	....	2,554	2,680	2,498	2,000	.....	7,141	.....	1,101	.....	8,242
PS of Colorado	1,650	1,620	1,500	1,423	1,350	178,500	167,800	26,280	25,916	229,000	216,431
PS of N. M. (Albuquerque)	1,520	1,350	1,277	1,104	1,092	58,562	55,409	9,234	8,867	67,859	64,276
PS of N. M. (Deming)	1,455	....	1,192	1,063	1,044	1,782	1,825	782	785	2,564	2,610
PS of N. M. (Las Vegas)	1,399	1,305	1,271	1,110	1,020	2,991	2,934	650	625	3,641	3,559
PS of N. M. (Santa Fe)	....	1,250	1,150	1,060	960	.....	7,723	.....	1,427	.....	9,150
Puget Sound P&L	4,900	4,800	4,750	4,310	3,840	153,000	148,035	15,500	15,253	169,000	164,092
Raton PS	2,491	2,240	1,630	1,915	1,676	2,280	2,232	421	416	2,701	2,648
Rawlins Elec.	1,750	1,540	1,440	1,440	....	2,550	2,200	.....	.....	.....	.....
Riverside PU Dept.	1,900	1,960	1,992	1,500	1,620	17,050	15,704	1,792	1,765	18,842	17,469
Sacramento MUD	2,349	2,190	2,100	2,055	1,885	87,914	82,355	12,753	12,189	104,402	98,162
Salt River Power Dist.	2,000	3,240	3,375	5,000	3,200	28,750	25,030	1,000	900	29,750	25,930
San Diego G&E	2,240	1,985	1,884	1,857	1,647	175,000	163,806	27,230	25,707	210,600	197,667
Seattle Lighting Dept.	5,900	5,800	5,638	5,212	5,070	182,548	177,029	24,980‡	28,560	209,307	207,212
Sierra Pacific Power	3,858	3,602	3,450	3,300	2,869	23,953	23,005	4,195	4,015	28,148	27,020
Southern Calif. Edison	1,730	1,577	1,510	1,495	1,382	906,000	851,456	176,000	171,032	1,082,000	1,022,488
Southern Colorado Power	1,800	1,754	1,662	1,590	1,510	34,112	33,550	4,379	4,147	41,649	39,081
Southern Nevada Power	10,180	....	9,100	10,408	8,253	12,336	10,730	.....	.....	.....	.....
Southern Utah Power	3,060	3,516	2,745	2,048	....	3,575	3,550	679	.....	4,490	.....
Southern Wyoming Elec.	1,550	....	....	1,180	....	4,990	4,880	.....	.....	.....	.....
Southwestern PS, Texas*	1,569	1,452	1,276	1,250	1,085	112,073	101,686	24,243	22,798	150,930	137,925
Spanish Fork Mun. P&L	2,500	2,500	....	....	....	1,536	1,470	.....	.....	.....	.....
Springville Mun. P&L	....	....	....	2,100	2,520	.....	.....	.....	.....	.....	.....
Tacoma PU Dept.	6,550	6,432	6,600	6,200	5,700	49,700	48,414	5,700	5,657	56,500	55,360
Telluride Power	2,850	2,700	2,340	2,000	1,776	6,900	6,800	800	800	7,700	7,600
Tucson GL&P	1,950	1,750	1,628	1,670	1,617	42,128	37,709	7,388	6,657	49,080	44,705
Turlock Irrig. Dist.	2,296	....	....	3,080	....	14,613	14,105	2,068	.....	16,781	.....
Uintah P&L	....	3,280	....	....	2,350	.....	930	.....	.....	.....	.....
Utah P&L	3,180	2,935	2,692	2,548	2,314	160,013	156,592	17,001	16,609	180,045	176,168
Washington Water Power	6,144	5,747	5,565	5,144	4,709	88,600	87,449	13,440	13,209	123,000	119,572
Western PS	1,671	....	1,400	1,360	1,234	4,288	4,212	661	646	4,949	4,858

† Consolidation of Central Arizona L&P, Arizona Edison and Northern Arizona L&P
‡ Under recent rate reduction light and power accounts combined
* Figures for entire company include Roswell, N. M., properties

sales were down 7%. Refrigerator sales moved ahead of 1951 in July, after a 6% slump during the first half of '52. Air conditioner sales went far ahead of any previous period.

A laundry campaign in September and October produced a gain in dryer sales of 23% over September 1951. Ironer sales were 10% over the same period, whereas for the previous eight months they had fallen 48% behind. Automatic washer sales were ahead by 7% and ahead of August by 10%.

Promotions in 1953 include electric bed coverings, planned kitchens, electric sinks, electric ranges, water heaters, refrigerators, housewares, all-electric cooking, home air conditioning, fans, freezers, laundry equipment and portable lamps. More advertising is planned and a promotion of open-end mortgages is planned jointly by the appliance and supply and apparatus sections.

The radio-TV section prepared the industry and public for the advent of television, organized training courses for service men, set up advertising standards, and surveys and tabulates receiver sales.

The supply and apparatus section carried on commercial electric cooking, store lighting, and commercial and residential air conditioning campaigns. In 1953 it plans for an office relighting campaign, a spring residential and commercial adequate wiring modernization program, continued promotion of adequate wiring and lighting, and air conditioning.

Wyoming

Cheyenne LF&P

We will continue to promote and sell the major electrical appliances.—*W. B. Petch, commercial manager.*

Canada

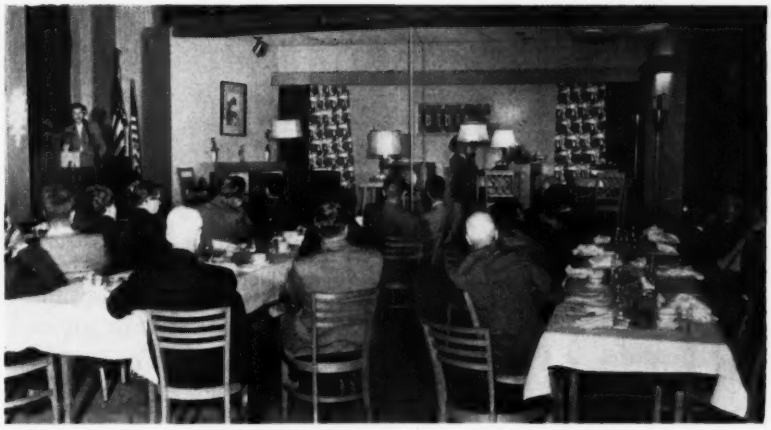
B. C. Electric, Vancouver

Load-building activities in our residential, commercial and industrial classifications will be carried out during 1953.

In the residential field this will be concentrated principally on cooking, water heating and the electric clothes dryer.

There is no power shortage in this area and every effort is being made to increase the use of electricity amongst all classes of customers.

There is a possibility that we may have a local television station in operation late in the year or early in 1954. At the moment, we have limited television reception from Seattle—121 air miles away.—*John H. Taylor, customer services manager.*



Department store lamp sales people told how to light condition by Utah Power & Light

B. C. Electric, Victoria

We will again conduct our annual old range roundup with the bonusing being done by the power company and the manufacturers in cooperation. Cooking schools with our own demonstrators, but under the auspices of dealers, will be increased.

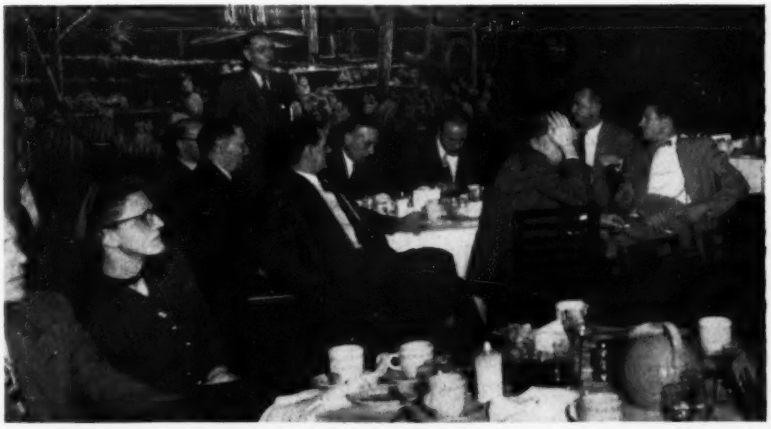
The current clothes dryer campaign, introduced last year, will be repeated. Use has been made of commercial shoppers, checking on sales presentations, which produced such a surprising report that considerable additional training of sales staffs will be vitally necessary this coming year.

With two stations bidding for TV license in Victoria and construction promised by both in 1953, an all-out promotion will be undertaken. Presently on the Seattle fringe, a good volume of sales has already been experienced.—*A. W. J. Smith, sales manager.*

Hawaii

Hawaiian Electric

We plan on promoting ranges, water heaters, dryers and freezers the coming year. Merchandise operations of our company are carried on through a separate division known as the Hawaiian Electric Supply Co. and this will be continued in 1953.—*C. E. Nolan, vice-president and promotional manager.*



Spokane dealers analyze problems at an Inland Empire Electrical League meeting

ELECTRICAL WEST

Rainmaking and Law

FROM Canada to Mexico and from the Rockies to the Pacific the cloud-seeding generators of the rainmakers are going to contradict Mark Twain during 1953. For better or worse somebody is going to try to do something about the weather. Power companies, both private and municipal, irrigators, federal agencies, associations of farmers and others have plans afoot to increase the West's water resources by extracting unnatural amounts of water from the skies. How much more precipitation they will produce is anybody's guess. However, past experimentation indicates that more rain and snow should fall in the watersheds where the silver iodide smoke treatment is applied.

All of this will be done without benefit of regulation or of law. There are no water rights as yet defined for the clouds that pass overhead. However, the first time one area using cloud-seeding gets plenty of precipitation and an adjacent area gets none the courts will be filled with suits. The legal aspects of rainmaking will then come to the fore.

The 1953 programs of cloud-seeding are leading to speculation as to how heavenly water rights can be assigned. Western water law as applied to surface waters is clear and definite. Perhaps its doctrines can be applied to clouds. Some kind of law will be needed before the year is out.

Load Building Again Soon

THE other day Bayard L. England, president of EEI, made the prediction that within two years every utility would be definitely feeling the need for load building on a large scale. He said it because evidence now is that some future sales pressure will be necessary and it takes two years between a decision to build load and the actual addition of substantial amounts of load. A combination of circumstances here in the West during recent years has pushed selling into the background. Population and industrial growth has been phenomenal and almost automatic. Coupled with that has been an actual shortage of power supply over a large segment of the area. However, the power shortage bogie is fading; everywhere supply promises soon to be ahead of demand. So sales organizations and sales planning should be getting the same sort of time and attention that plant expansion has been receiving. It takes time to train salesmen and unfortunately the supply of good salesmen is small.

Information Imperative

EXPERIENCE over the years has proved that the benefits and advantages of any national industry program are only secured by intensive effort and application at the grass-roots level. The degree to which the program is applied locally will determine its ultimate success. In the light of such experience just how many Far Western utility companies can rationalize their absence from the Electric Companies Public Information Program is beyond comprehension.

The 1953 PIP objectives apply especially to this region and they warrant the active support of every Pacific Coast and Rocky Mountain utility. Here are some of the aims: (1) Help and support for those who wish to supplant federal domination of regional power development with free enterprise operation and development. (2) Helping the American people to understand the importance of dependable electric service under enterprise development. (3) Work for public knowledge and understanding of the contributions of the electric and other industries toward commercial development of atomic power so that private capital rather than government will do this job. (4) Build clearer public appreciation of the inequities and inequalities of the preference clause. (5) Create public opinion favorable toward a new and equitable federal power policy, one fair to public and business alike.

To us this sounds like a program worth working for at every conceivable level and by everyone in the industry.

EDITORIAL VIEWS

Television's Stratotistics

NOTHING in recorded history has skyrocketed into stratospheric figures like television. This new electronic industry has jet propelled itself into the rarefied stratosphere of millions both in numbers of sets and in dollars, a region hitherto occupied almost exclusively by big government. Impeded both by diversion of its major production to defense electronics and by a "freeze" of new stations and hence markets, it still produced more than six million TV sets and almost ten million radios in 1952. Where it will go in 1953 with the freeze lifted and some 100 new stations on the air is something like eight million sets.

As the year 1952 began there were TV stations only in Los Angeles, San Diego, Phoenix, Albuquerque, Salt Lake City, San Francisco and Seattle in the West. Before the year ended Denver and Portland had at last received television, Spokane was on the verge of having it, Fresno also; Pueblo and Colorado Springs came next. In 1953 nearly all of the West's long-starved areas will be reached by new stations.

When television first comes to an area the effect is as if flood gates had been opened. But one area in the West with the longest experience, the Los Angeles area, now has statistics showing a pattern that may well be found repeated in each new station region. There are seven stations serving that area, most of them since 1948. In that year there were 79,600 sets sold, according to figures of the Los Angeles Electric League. In 1949 sales leapt to 270,000; in 1950 to 530,094. Then the dip came. In 1951 sales were only 281,266. In 1952, with its election and other great events, sales went up to 329,793. A total of 1,490,829 sets has been distributed in the area—a saturation of 77%, a set to each four people or 1.3 households. About 640,000 sets have 16-in. or smaller screens and become the aim of the replacement market.

The West's set sales in 1953 should be in millions—it was 800,000 in 1952. TV's saturation horizon is nowhere yet in sight.

You Can Say That Again

THREE principal items are involved in any successful economy. These are: men, materials and tools. Men are the human energies supplying the ideas, the direction and the skill involved in changing the form, condition and place of natural resources. Materials are the natural resources to be changed from their natural form or state, condition and location. Tools are the plants, factories, equipment and services necessary to convert these natural resources into material things to meet our present-day needs and improve our welfare. The public utility business requires an investment of approximately $40,000 in equipment and facilities, termed "tools," back of every employee engaged in the business. Where do these dollars come from? Approximately $20,000 is borrowed money—principally from insurance companies, trust funds, savings accounts representing the savings of many small insurers and investors. The other $20,000 might be termed "risk dollars" or "venture dollars," and is more commonly known as equity capital. These are the dollars that play the most important part in our free enterprise economy. When given an opportunity to earn with reasonable security, these dollars are readily available . . . These risk or venture dollars are cautious and when confronted with exorbitant or duplicating taxation, discriminatory regulation or government competition, they seek other fields where these conditions do not prevail . . . If our customers and communities are to be properly served, we must continue to attract equity capital to our industry to provide the necessary men and materials and tools in order to satisfactorily take care of the growing needs of homes and industries.

—John E. Loiseau, president, Public Service Company of Colorado.

Experimental only so far is the 10-cu-ft pass-through refrigerator-freezer that General Electric Co. showed at the Chicago Merchandise Mart. Has ½-in-thick walls only of a new type just developed; magnetically sealed doors without handles. Occupies only half the space needed for an ordinary 10-ft refrigerator, made possible by 10 times more efficient new insulation. Also serves crushed ice, or cubes or iced drinking water

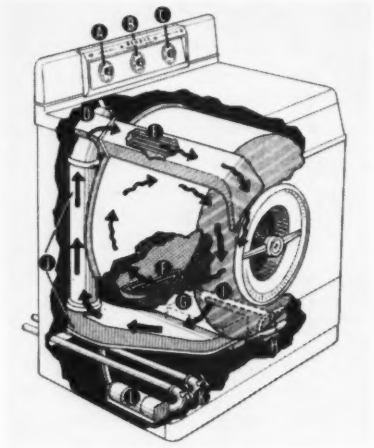
Really New

Servel's new refrigerators cast ice circles and drop them into a basket instead of using ice trays. Servel now makes electric compressor as well as absorption models and the little portable Wonderbar refrigerator

This year will see strong promotion of many makes of room air conditioners. This is the Fedders-Quigan 1-ton capacity model for home and office window installation

Newest improvement in dishwashers is Hotpoint's double detergent cup and double washing cycle. The cup is balanced so that it feeds detergent to each of two washing cycles with rinse in between. Other improvements include a "phantom drain" that eliminates special valves, telescoping plastic-covered racks to adjust for tall plates

Sensationally new and long needed is the Westinghouse electronic eye, plug-in-type range unit that won't let food burn, the first automatic surface unit to be made



Bendix is first with a combination automatic washer and dryer whose drying principle is illustrated above. Fits into 36-in. of kitchen space; has a 65-minute total cycle. Either washer or dryer can be operated independently and the cycle length changed

Self-contained moisture condenser and lint accumulator is Frigidaire's exclusive feature in its automatic clothes dryer. Now a model to operate on 120-v, 20-a circuits, needing no vents, plumbing or extra wiring, has been added to the 230-v major models

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Good year foreseen

Good weather throughout most of the West has given 1953 construction an early start. Rain in the Pacific Northwest has relieved the power shortage and taken that obstacle off of electric installation. Except for large-sized wire, materials seem to be available with less delay in delivery. Manpower seems to be reasonably ample. There are a lot of projects on the drawing boards. Only difficulty is that there are lots of bidders on every job and pencils seem to be pretty sharp again.

Roll their own

Something to think about when wage or fringe negotiations are going on—30% of the building materials sold in 1952 were bought by individuals doing their own work, the president of National Sales Executives said. That's an index of how contractors are being priced out of the market for home additions and repairs as well as quite a lot of home building.

Ersatz wire

Warning is issued by Ed McLaughlin, chief electrical inspector at Richmond, Calif., that several thousand wartime housing units are being torn down and that the paper-insulated emergency wire torn out may be put on the market as nonmetallic sheathed cable and sold to unsuspecting home owners for wiring their own places. What should be done with it is to sell it for scrap copper. Inspectors are asked to advise home permit applicants against being sold such junk.

Lid is off

Wage controls were dropped by the President, Feb. 6. What that may mean in a rash of new wage demands remains to be seen. During the last two months the Wage Stabilization Committee, set up when the Wage Stabilization Board fell apart with the resignation of industry members, limped along. The building trades, under the Construction Industry Stabilization Commission, continued under that body uninterrupted.

Still hungry

Vallejo's local 180, IBEW, and the Solano-Napa County Branch of Northern California Chapter NECA, for instance, were given the $3 journeymen rate common to the area by CISC, effective Jan. 1. Now the union asks for a 7½c an hour welfare plan. In fact all locals have put in the same demand in opening renegotiations.

Public reaction

California Legislature has before it an unusually large number of bills aimed at correcting labor union abuses. There are bills to ban the closed shop, to prevent unions from forcing college students to join a union, to establish compulsory open shop, to stop "hot cargo" and boycott tactics. In Washington hearings will begin soon on amendments to the Taft-Hartley Law, among them something to clarify the status of construction industry agreements, where voting on representation is impractical for every construction job and continuing agreements have been the practice. A recent National Industrial Relations conference debated whether the antitrust laws should be enforced on excessive union power.

Old bill, new dress

Several bills have been introduced in both the Senate and House in Washington to curb bid-shopping on government works contracts, bills similar to the S 2907 that almost got to the floor of the 82nd Congress. Hearings on these will begin in March. Representative Jonas of Illinois has introduced H.R. 1825, which may become the one bill to watch.

Lighting maintainers

Bert Osterman, who heads the fluorescent maintenance department of T. L. Rosenberg Co., Oakland, now heads a newly formed organization that grew out of a meeting of lighting maintenance company representatives at General Electric's Nela Park, Cleveland, Jan. 22-23. It will be called something like Associated Lighting Maintenance Companies of America. Vice-president is Ken Purington of Davenport, Iowa; secretary-treasurer is Edward Creed of Cleveland. Some 30 companies doing this type of business were represented at the Nela Park conference . . . T. L. Rosenberg Co., by the way, opened a branch for lighting maintenance in San Francisco in October, will have one in Fresno soon, as well as Marysville.

Will welfare plans give way now to straight wage increase demands as the controls go off? After all, welfare demands were phoney; a way to get more under a subterfuge because wages had reached the ceiling. In the construction industry any welfare scheme will be hard to administer and complicated because of employment for short periods by many employers. The overhead of running a plan may eat up all the deposits into it, leaving little for health or welfare. But because steel workers were given a sop of it and WSB, over the protest of its industry members, gave a welcome to welfare fringe proposals, unions have taken the attitude that "the law says we can have it."

More socialism

California Conference of NECA chapters at its meeting in Fresno had this problem uppermost. Local unions under needling by the IO office have all asked for the 7½c and are advocating a plan set up by the IBEW. Contractors have asked time for more thorough study. A committee of labor negotiators from the NECA chapters, with Emil Weber, president of the San Francisco association, as chairman, after long meetings and discussion, recommended: (1) that any plan be on a state-wide basis; (2) because all agreements must be amended to include them, consideration be given to a possible state-wide agreement on wages, hours, overtime, tying wages to a cost-of-living index and long-term contract, in one package; (3) that no funds be accumulated until a state-wide decision is reached. Meanwhile more data on costs, various plans, experience with them, etc., is being accumulated on which to base the ultimate decision.

If, as and when

Council on Industrial Relations for the Electrical Contracting Industry came up for criticism, particularly the contractor members of the panel, for lack of study of issues placed before them prior to hearings. The NECA Chapter Conference sent a resolution suggesting more responsibility in representing contractors against the professional team of IBEW top men. Except for minor details no case from the West ever submitted to the Council has ever resulted in a decision favorable to the contractors. Some reforms have been made in the last few years but the council still is not yet a true arbitration board.

One-sided "justice"

Election time saw few major changes in California chapters of NECA. Emil J. Weber, president; Rod Newman, vice-president; E. W. Scott, secretary; and L. Roy Moser, treasurer, were re-elected by the San Francisco association. Earl Peak Jr., son of the famous NECA president years ago, was named governor for the San Francisco chapter . . . Across the bay the Northern California Chapter elected Victor C. Perero, El Cerito, as president; Harold Pierce, Vallejo, as vice-president; W. A. Cyr, treasurer; and John Brahmst, past president, succeeded Paul Pease as governor . . . Sacramento Valley Chapter advanced its officers a step, naming W. E. Cotter president to succeed Louis Stein; Paul Benge, vice-president; A. J. Naylor Jr., treasurer. Frank Merwin remains governor.

New leaders

Vancouver's electrical industry is getting ready to welcome the NECA District 6 Conference there May 7-9 at Hotel Vancouver. John B. Majerus, Puget Sound Chapter manager, C. F. Meager, its president, met with Vancouver Electrical Assn., the contractors' organization, to discuss arrangements . . . District 8 Conference plans are being made by Charles Simpson, regional vice-president, of Cheyenne. It will be held at the Northern Hotel in Billings later in May.

Red carpet

CMP is likely to just fade away before long as materials become more and more plentiful. NPA is dropping controls each week as fast as materials come into ample supply. Even aluminum has recovered quickly from the Northwest power shortage shutdown. Copper is still tight and also confused. The domestic and foreign price differentials are really making it difficult for wire mills and copper fabricators to get copper at ceiling prices. The import tax was suspended by Congress until June 1954, which helps some. Aluminum prices were allowed to rise.

Materials easier

Considerable trouble has been reported from series sequence ballasts for fluorescent lighting where the voltage surged high on occasion. Also from radio interference where used in schools.

Strange behavior

Simon Halle of Colorado Springs is on the program of the National Adequate Wiring Conference at Chicago Feb. 27. Halle is president of the Rocky Mountain Chapter, NECA, and a member of the NAWB directorate. He told the dealer organization, NARDA, how adequate wiring affected appliances.

Advocate who knows

Television isn't all entertainment. There are some fine industrial opportunities for its use. For instance the Ewa and Waialua Plantations in Hawaii have installed an industrial TV set to enable the control operator to watch the sugar cane as it moves from washing plant to mill. . . . A Western manufacturer, Kaye-Halbert Corp. of Culver City, now has the Cyclops, a 16-mm size TV camera, for custom mounting near industrial processes to be watched remotely on a monitor, where all controls are located. Even focusing can be controlled there. — **Hopalong industry**

All-Brite of California has just announced two new fluorescent fixture designs. The first, a long-needed one, is a unit to light school chalkboards. With baked enamel interior the exterior can be painted to match trim and the unit becomes inconspicuous. The other is a clear, contemporary style of luminous indirect commercial fixture with curved plastic panels giving low surface brightness, using either slimline or standard fluorescent, two- or four-lamp equipment. — **Light on the board**

Price reductions have been announced by Arrow-Hart & Hegeman Electric Co. for its main and range-type pull-outs. Reductions run $1.30 on four branch circuit types, $1.95 on six, $2.75 on eights. — **Drops**

Dolph has a new stator compound called Dolflex CR-1018 Red Organosol that is a plastic coating to be brushed on and baked, having high chemical resistance, waterproofness and high build-up. It bakes on in 30 minutes without preheat. — **Quick coat**

NuTone now has a recessed chime with all mechanism behind the wall line and only a clean grille seven inches square showing to go with the interior decor of any house. Besides its attractive appearance the tone is improved by a double resonator tube. — **Hidden chimes**

Federal is a much used name, so we hasten to add that the Federal board pictured on page 91 of our January issue was made by Federal Electric Products Co.'s Los Angeles plant, and Frank Leo supplied the pictures and information. Federal Noark, by the way, celebrated making its ten millionth Stab-lok circuit breaker since its introduction 2½ years ago, quite a record. — **Which one**

Plastic conduit spacers of all sizes and types, that can be assembled or dismounted quickly, made by Underground Products Co. of Garden City, N. J., are now being handled in northern California and Nevada by Eichorn and Melchior, manufacturers agents, San Francisco. — **New and light**

Teo L. Rosenberg, Oakland electrical contractor, announces that he has brought in Roy A. Brockman, for many years with Central Electric Co. and prior to that with H. S. Tittle Co., San Francisco, as general manager of T. L. Rosenberg Co. Recently also Ken Moyle, who was application engineer for Sterling Electric Motors and had at one time a motor shop in Brawley, was made sales manager of apparatus sales and superintendent of the motor repair shop. — **Staff changes**

Draft of a bill to supplement the Washington State Electrical License law, prepared by the Washington State Electrical Council, has been sent to all senators and representatives of that state and Harley Post and Chester Kirsop, both of Olympia, have been appointed by Chairman James Fletcher to contact the legislature on behalf of the bill. As presently drafted the bill is limited to setting up a permit fee system in order to finance more adequate inspection. The previous law depends on contractors' and journeymen's licenses only. — **Another try**

Julius Hooper, founder of the Electrical Contractors of Washington, is to be honored at the annual meeting of the organization upon his return from a trip to California. He has been recovering from an automobile accident last year. Usually held earlier, the meeting awaited his return. — **Honor founder**

G. Burnett Mason has been appointed northern California supervisor for the Westinghouse Electric Corp. agency and construction department. — **New job**

McMillen-Stanley Sales Corp., Pryne, Clifton, etc., representatives, has a new corporate set-up about which a story will appear next issue. They've adopted the figure of a traveling man with brief case as trade-mark. — **New corp.**

Montana law

Montana legislature was presented SB 114 by Working and Hibbs on Jan. 31. It would establish a state electrical inspector to inspect all "inside" electrical construction under provisions of the National Electrical Code. It would also set up licensing of electrical contractors at $75 a year, of journeymen at $5 a year, and permits to apprentices. Such licenses are the sole support of inspection, for no permit or inspection fee system is proposed. The bill has the support of the Montana Chapter of NECA, of the IAEI and of the inside locals of IBEW.

Bus and trolley

Tubbs Electric Co. of Spokane has been appointed a distributor of Trumbull Division, G-E Co., products in the Inland Empire territory and will establish a new industrial supplies department in addition to its wiring supplies and appliance distribution.

Pioneer passes

Claude Saviers, owner of Saviers' Electrical Products Co. of Reno, died of a heart attack, Feb. 5, in Las Vegas, where the company also has a branch. Saviers' has been one of the pioneer electrical firms in Reno, starting as a paint store, then with appliances, later supplies, becoming a wholesale distributor only in recent years, a Westinghouse agency.

Don moves Westward

Graybar has a new manager in Denver as Sam B. Hardin retired Feb. 1. He is D. M. Hitchcock, who started in San Francisco 30 years ago and only a year and a half ago was transferred to Des Moines, Iowa, as branch manager there. Hardin had been with Graybar 36 years, the last 17 in Denver.

New actor

Reuben E. Lagerstrom now represents Century Lighting Inc. in the northern California area, succeeding Jim Turner, who has given up the agency business to do research work at University of California. This line includes a complete range of stage and TV studio lighting equipment.

In the ultraviolet

Since Keese Engineering Co., original agents for Cooper-Hewitt and ultraviolet lighting equipment, discontinued operations, Leo Kaufmann, its San Francisco manager, took over the line in northern California as manufacturers' representative and distributor. They include G-E Lamp Division contract agency, Acme Lighting & Mfg. Co., Ultra-Violet Products Inc., Shannon Luminous Materials Co. and Cooper-Hewitt Electric.

Heat men

Thermador has appointed two new sales engineers for the San Joaquin Valley and west Los Angeles areas. They are Robert Westra, San Joaquin Valley district sales engineer, headquartered in Fresno, operating under William H. Gribble, northern California district manager. He was formerly with Frigidaire and later Crosley. Gerrit Warhuis will serve the west Los Angeles area from the main factory office.

Big Time conference

Registrations are being taken now for the 1953 Electrical Maintenance Conference of the EMEA of Southern California, to be held at Rodger Young Auditorium, 936 W. Washington St., Los Angeles, March 18-20. It starts with an evening dinner session, then two full days of educational sessions and a field trip to Kaiser Steel at Fontana. There will be five conferences meeting concurrently on: (1) records, planning, scheduling; (2) lighting maintenance; (3 & 4) maintenance of electrical equipment in industry, by industries; (5) special instruments, tools and methods. Speakers include: R. C. Samuels, American Potash & Chemical; E. J. Butland, Lockheed; Floyd Mayfield, Standard Oil; E. F. Donatic, Kaiser Steel; Ray Dingler, Monolith Cement; R. J. Kernaghan, Goodyear; R. H. Disterdick, Los Angeles County; B. J. Hartmann, Flood-Lite Service; H. M. Eversz, McCulloch Motors, and Foster Sampson, consulting engineer.

Lighting training

Illuminating Engineering Society, Puget Sound Section, with Edison Technical School of Seattle, has started a lighting school, Feb. 2, to run through March 23, each Monday night. Beverly A. Travis is chairman of the education committee that organized and is running it. Speakers include Fred Cooper, Westinghouse; Travis; Henry Huber, Benjamin; B. T. Heinz, Silvray; W. K. Turner, Curtis; Don A. Pearson, G-E; Irene McGowan, Fixture Designs; Arthur Seigal, Selo Electric; G. Don King, Sylvania.

Now in movies

"Octopus in the House" is the title of a sales tool for adequate wiring, a full color and sound movie produced by National Electrical Products Corp., with a Broadway stage cast. It tells a human and humorous story of a couple living in a home with outmoded wiring. John Longden presented it at the Intermountain Electrical Assn. Ogden conference.

ELECTRICAL WEST Sales Guide

News Letter

February 1953

FOR THE ELECTRICAL MERCHANT OF THE WEST

The markets--Chicago, New York, Los Angeles and San Francisco--give a clue to what 1953 will be like in merchandising of appliances. In one succinct sentence this is it: Tremendous pressure from manufacturers to dispose of new tremendous output of more full lines will be put on distributors and dealers; the dealers' inventories are low and interest in the new models and merchandise is good, buying is active--now to match these two forces with actual selling! If huge advertising will do it, this year will see the doggonedest artillery barrage ever. Question remains whether there are enough ground troops to dig customers out of their sales-resistance positions.

Markets a clue

Winter Market at San Francisco Merchandise Mart was the best attended in history and all exhibitors reported fine interest, good attendance, substantial orders, an optimistic outlook. Details of that market week, its big Appliance and Radio-Television Trade dinner speakers, Bob Gros, PGandE, and Sizzler Elmer Wheeler, must await next issue. More upright freezers, 30-in. ranges, dryers and 21-in. and over TV tube models were the trend. Servel withheld its new ice-maker until after the big road show Feb. 11. Westinghouse made its first showing of the new electronic surface unit for its top range. Bendix featured its Duomatic washer-dryer as well as its new full line. Thousands of lamp "styles" but very little for good illumination.

Western market

Big meetings of the recent past by associations have included that of Intermountain Electric Association at Ogden and that of the Electric League of Los Angeles, both of which will be reported in detail next issue. Mark Austin, Sunbeam representative, was named president of IEA succeeding James Littlefield, Utah P&L. . At Los Angeles, Ray B. Cox, president of Horn & Cox, succeeds Ed Young, Sues, Young & Brown, as Electric League president. Jack Lacy was top speaker.

Two league conferences

Big one coming up is the annual winter conference of San Diego Bureau of Home Appliances, Feb. 18 in Balboa Park, with big-name speakers: Victor C. Eggerding, president, National Assn. of Credit Men, St. Louis; George Foerstner, executive vp of Amana; H. L. Clary, vp of sales of Norge; and Willie Mae Rogers, Admiral's director of home economics.

and one coming

A series of Jack Lacy sales training courses of four 2½-hour sessions each are being conducted to large enrollments in San Jose, Fresno, Sacramento, Oakland and San Francisco throughout the month of February under sponsorship of the Northern California Electrical Bureau. The courses were opened to other business groups; over 2,000 will take them.

Prepare for sales

Electric heating, long a taboo subject in the Northwest, is being given a new lease on life by the supply and apparatus section of Inland Empire Electrical League, Spokane. Clothes dryers get a big push in February and planned electric kitchens will be featured in March-April.

Open Sesame

Dooley's Hardware Mart of North Long Beach is being sued by both G-E and Westinghouse for violation of California Fair Trade Act. G-E has 17 suits filed throughout the nation. Sunbeam has a number also. . An Oregon court held that goods bought prior to the McGuire bill were not subject to Fair Trade restrictions.

Crack downs

Eleven electric appliance wholesaler, furniture manufacturer, and dealer representatives have formed a committee in Vancouver, B. C., under W. E. Napstead, a dealer, to investigate wholesale direct sales to consumers after a protest meeting at which it was claimed 35 to 40% of all appliances went through the back door. Napstead was recently elected president of the Radio & Appliance Dealers Assn. Dave Nemetz is vice-president.

Too much wholesale

Everybody has been holding showings of their new 1953 line, all but those who jumped the gun by showings in the fall. These showings have taken many forms, but the two big spectaculars have been the Westinghouse road show in late January and the Servel road show in early February, both putting a Broadway production on the road with scenery, gals, stars and factory top brass. (Stories and pictures next issue.)

See what is new

Frank Runyan, president of Western Merchandise Mart, San Francisco, admitted at a press luncheon that negotiations were under way for acquisition of the Mart by eastern financial interests, but promised there would be no change in Mart policy or purpose.

Confirms

Northwest Appliance & TV Assn. has decided to hold a 1953 Appliance and Television Sales Conference, the first such affair to be held in Seattle on Sunday and Monday, Sept. 27-28, at the Norselander. Tod Oliver, Seattle Gas Co., is conference chairman, assisted by Keith Davis, association president, Tom Carmichael, Ward Davison and others.

First conference

Cooling is going to be big business this summer, judging from the number of companies offering refrigerated room coolers, air conditioning of various degrees, and even the evaporative cooler and fan businesses were no slouches last summer when temperatures broke records. . York has announced a reverse cycle heating or cooling conditioner of both window and console type, 3/4 and 1 hp. . Servel will be in competition with a gas-fired unit of 2 and 3 tons, besides window coolers. . Frigidaire too has window units and a packaged 3- and a 5-ton complete cooling and heating unit. . Perfection Stove showed 2- and 3-ton year 'round jobs at the International Heating & Ventilating Show at Chicago. . Carrier is readying units for small homes mass markets. . General Electric's general manager of its home heating and cooling department, S. J. Levine, met with G-E distributors from Salt Lake City west on Jan. 8 in San Francisco to show G-E's new developments in air conditioning, although its heat-pump is in a different department and that, with a dozen or more pilot jobs operating in the West, looks like the big thing to come.

Hot for cooling

Admiral and Universal Major Electric Appliances are the two latest entrants in the room-cooler field along with such fast company as Mitchell Mfg. Co., Frigidaire, RCA, Servel, Remington (distributed by Wesco), and Deering, Welbilt Stove, Emerson Radio, Tele-King, Fedders-Quigan, Quicfrez, Crosley, G-E, Carrier, York, Coolerator; probably others.

The fast field

A cool summer

Shortage of fans last year because of undue hot weather should be eased this year with new lines of fans and display boards, ads and literature by such fan makers as: Fasco Industries with a new 5-fan display board; NuTone with its combination Heat-A-Lite; Kisco with a Regal-Aire Junior floor stool-type and a new cabinet window fan; Robins & Myers with special display racks for either the double fan for window or a single; Meier Electric & Machine Co. with attic fans, wall and window fans, a Nu-Air dehumidifier, portable and wall electric heaters; Vornado, with a full line of its Air Circulators; Westinghouse with a new four-way window fan mounted on wheels and 17 models of other fans; Hotpoint with a dehumidifier. . From Kool Air Engineering Co. of San Bernardino comes word of a new Attifan, which simultaneously ventilates both kitchen and attic, using a jet principle to draw out kitchen odors.

TV flashes

Quickies of TV news: XETV, Channel 6, at Tijuana, Mex., is a big-time operation with a half million on site and equipment, the latest and most up to date. Owner George Rivera, who lives in San Diego, has asked FCC for permission to build a San Diego studio; is opposed by San Diego stations. . Los Angeles city council turned down a **licensing** ordinance for service shops thanks to L.A. Electric League protest. . The ABC-Paramount merger deal is still not approved by FCC though it looks like it may be. . Western Union has asked FCC for a channel to operate as a common carrier for theater TV and be a competitor of AT&T.

..and more

When Sylvania opened its new electronic plant at Mountain View, Calif., the press was told Sylvania may begin making compatible color TV in 1954 as FCC approval is foreseen by then. . Sparton has put in a laboratory to develop color TV. . Chromatic TV Lab of Oakland, making Dr. E. O. Lawrence's color tube for Paramount said it is ready to go on color tube production as soon as FCC gives okay. . Minnesota Mining & Mfg., the Scotch Tape makers, are working like mad to perfect magnetic taping of TV programs to replace photo film because it would be quicker, cheaper and re-usable. . Santa Barbara expects its station on Channel 3 to be on the air April 1. Its 50-kw station on a 4,100-ft peak will reach San Diego and the San Joaquin Valley. . Ernest Vogel, G-E manager of TV marketing, on his way to Hawaii told S.F. press G-E will build a huge warehouse in southern California to serve the West with a bigger percentage of its production. . Admiral announced it has a research lab at Palo Alto for color TV and electronics. . Motorola has organized a subsidiary for its communications and electronics business. . Westinghouse now aims to be a major manufacturer of TV tubes, which it calls Reliatrons. . RTMA has appointed a special committee to survey the possibilities of subscription TV. . University of Denver Research Institute has developed an antenna reflector, simple to make, to reflect TV signals down into hidden canyons in the Rockies.

Changed distribution

Line changes--Walter J. Epstein Inc., has been appointed Ben Hur freezer regional distributor in San Francisco. . Admiral Corp. has consolidated seven subsidiary distributing companies into two corporations. Golden State Appliance Co. in Los Angeles and San Francisco and the San Diego distributorship are to be Admiral Distributors Inc. M. J. Nocolin was named vp and general manager of the San Diego division. . Hoffman Radio has appointed Graybar as Idaho distributor, Boise. CBS-Columbia TV named Gilbert Bros. of Portland as Oregon distributor. . Savage & Son was made Emerson Radio distributor from Denver for Colorado and southern Wyoming. . In Phoenix G&W Sales is distributor for DuMont television, also for Tucson. . Raytheon TV & Radio has Tri-State Distributors in Spokane. . Youngstown Kitchens named Northwest Kitchens Inc. in Seattle, Kitchen Distributors in Portland and Contractors Supply Co. in Billings among its new distributors.

A series of merchandising sessions for dealers and salesmen in the lighting fixture business will be conducted by the lighting fixture section of Los Angeles Electric League with Max Rosen, Incandescent Supply, and Nat Blumberg, Lightolier, co-chairmen. Sessions, six in all, start Feb. 17, will cover displays, reaching prospects, architects and decorators views on fixtures, adequate wiring and new trends.

To sell fixtures

Names in the News--Fred Fenton turned over the Western regional managership of Easy Washing Machine Co. to Jack C. West, who has been Northwest district manager in Seattle for the past seven years, as he retired Feb. 1, after 35 years with Easy. Plans to live in the south. . W. L. Constance has been promoted to appliance sales manager for Westinghouse Electric Supply at Vernon and William Tyra succeeds Constance as branch manager in Phoenix. . Don Lennard is back backing Thor as the man in charge of Thor washer department of W. J. Lancaster Co., San Francisco. . Robert B. Olin of Seattle has been made Northwest divisional sales manager of Bendix Home Appliances; has been with Admiral, before that with Toastmaster. . B. W. Reynolds resigned as manager of G-E Supply at Emeryville to become manufacturers' representative. . J. D. "Pat" Kilpatrick returned to San Diego with Western Radio & TV Supply. . Cecil H. Boyd, president of Boyd Distributing Co., Denver, moves to a new office building and warehouse at 1661 W. 3rd Ave. in March. . C. J. E. Watson, representing Landers, Frary & Clark for years in south and west, died at Beverly Hills, aged 76, Jan. 4.

People on the move

Erma E. Meeks, popular and well-known director of home economics for Hawaiian Electric Co., was married recently to Lt. Col. W. A. Boyen. Mrs. Boyen is a graduate of Oregon State, went to Hawaii in 1937.

Congratulations

R. J. West, L.A. manager of G-E Supply, announced the appointment of Albert H. Wiebe as local district manager of sales promotion. . Lee Arter of Los Angeles has been appointed to represent Casco Products Corp. in California and Nevada. . Growth of southern California and Arizona makes Telechron, Dept. of G-E, form a new district with John T. Casey Jr. new district manager, at 1151 S. Broadway, Los Angeles. . Elizabeth Heller has been appointed director of home economics for Golden State, pardon us, Admiral Distributors Inc. . William P. Harrison, manager of the appliance division of Sues, Young & Brown, L.A., is now president of the Los Angeles Housewares Club.

More names

National Appliance Trade-In Guide, 1953 edition, will be ready for delivery March 1, $5 a copy, covers six major appliances.

Ready

An electric model of Calcinator automatic garbage disposal unit or incinerator is announced by the reorganized Calcinator Corp. of Bay City, Mich. So far it is the only electric incinerator made.

Burn garbage

National Water Systems Month with special promotion for farm areas has been set as May, with posters and materials ready for dealers to use by April 15. Available from Plumbing & Heating Industries Bureau, 35 E. Wacker Drive, Chicago 1.

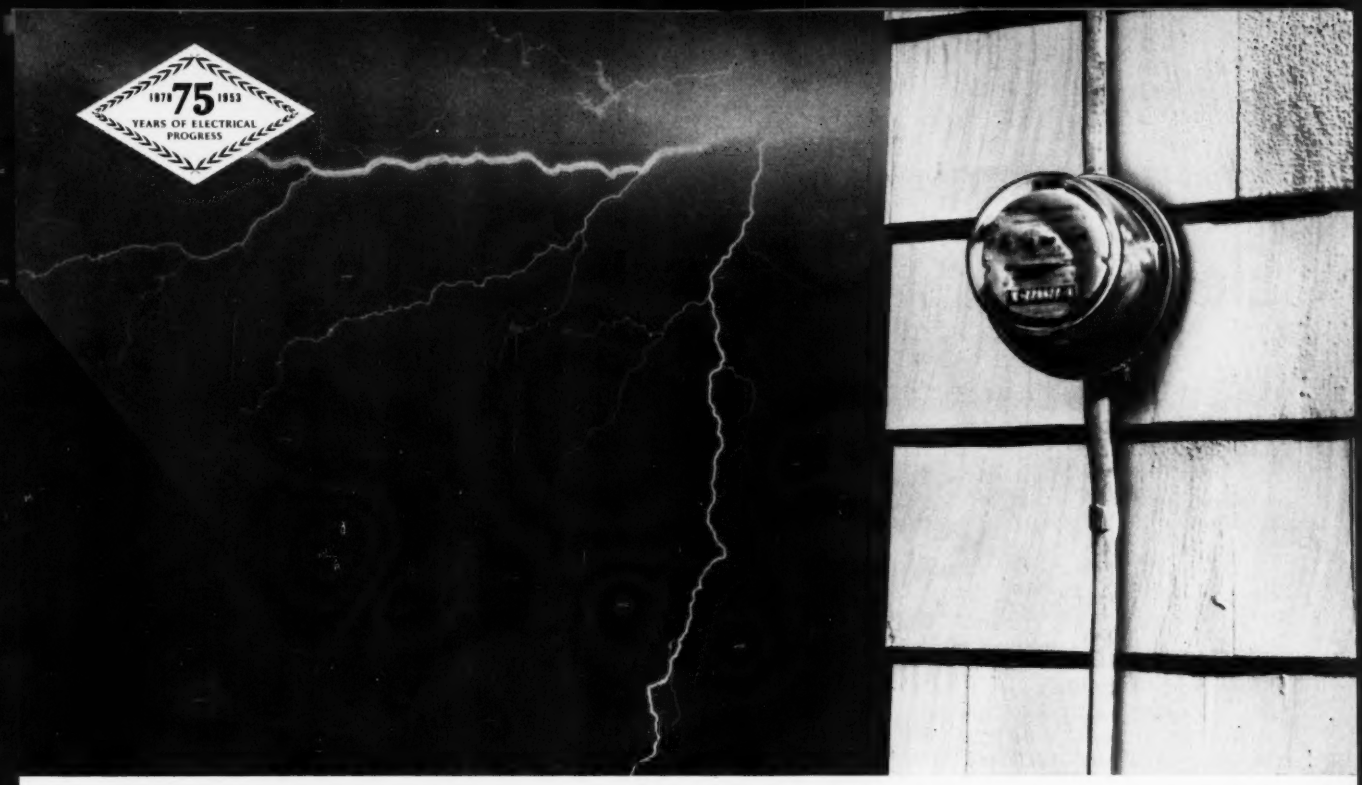
Farm market

The 1953 Construction Industries Exposition will move back to the Pan Pacific Auditorium, Los Angeles, for the Home Show, June 4-14.

Back

April issue of Electrical West will have an expanded and still more useful Directory Supplement, containing listings of Western representatives and sources for all electrical manufacturers, and a service and repair parts directory on all appliances. Trade names, Western supply sources and factory addresses will make this a year-round guide.

Save this issue



Even in cases of severe lightning surges, results show that you will . . .

Reduce Lightning Losses, Save Repair Costs With G-E Certified I-50 Watthour Meters

Service experience in severe lightning areas has shown that General Electric I-50 watthour meters have an unusual record of maintenance-free operation. This results from several significant design achievements embodied in the I-50.

The I-50 potential coil is molded of polyethylene insulation and the current coil is butyl-molded. The result: long life and high impulse strength.

RETARDING MAGNETS are of high-coercive alnico V encased in and shielded by the die-cast aluminum frame. This shielding provides additional protection against decalibration resulting from lightning surges.

Relief gaps, co-ordinated with coil insulation, protect the meter by confining any spark-over to a point of minimum possible damage.

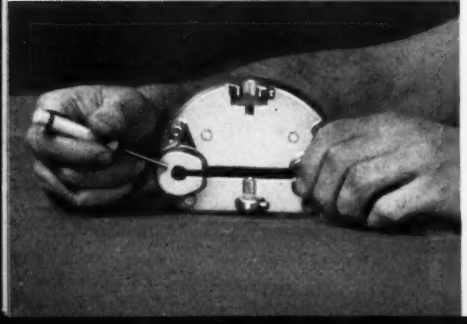
THE RESULT of this careful I-50 design has been an unusual freedom from operational failures, physical damage, or decalibration in service. This means savings to utilities in repair and maintenance costs.

For more information about the G-E certified I-50 watthour meter, ask for a showing of our new motion picture, "Accent on Accuracy." Call your nearest G-E representative or write General Electric Company, Schenectady 5, New York. 601-92

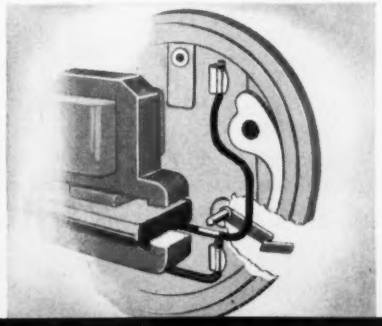
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

GENERAL ELECTRIC

RETARDING MAGNETS of alnico V, shielded by the aluminum frame, provide added protection against decalibration.



RELIEF GAPS are located so that the current-coil and potential-coil insulation will not be damaged by flashover.



MOLDED COIL insulation of I-50 meter securely holds coils to laminations and gives high dielectric strength and long life.

Train Young Electricians

Joint NECA and IBEW apprenticeship committee in Los Angeles covers six districts

Who is going to install all the new and more intricate electrical equipment being developed for the future? Will there be enough skilled electrical workers? Are the new ones getting as good training as the real old-timers did during their apprenticeship?

These questions naturally come to the minds of far-seeing electrical contractors. Such men are devoting a lot of time and energy, along with the business managers of the locals of International Brotherhood of Electrical Workers, on joint apprenticeship committees. While both IBEW and the National Electrical Contractors Assn. have top-level joint apprenticeship committees to stimulate such training programs, it still depends upon cooperation at the local level to get actual results. In this work the West has been particularly fortunate and strong apprenticeship programs are operating in Denver, Portland, Seattle, San Francisco, Oakland, Los Angeles and Pocatello. In San Diego the organization of joint committees is being started again. In Salt Lake City the training has mostly been done under union auspices alone.

Denver recently graduated 27 young apprentices, pictured here, at a presentation dinner. Address of the evening was given by W. F. Patterson, director of the bureau of apprenticeship, U. S. Department of Labor. Ralph E. Johnson, then District 8 vice-president of NECA, and W. C. Wright, IBEW District 8 vice-president; Edwin D. Strohminger, president, Rocky Mountain Chapter, NECA, and Myron Bailey, president of Local 68, IBEW, and various state and national officials connected with apprenticeship training, were among those who spoke.

Certificates were presented by E. E. Comstock, state supervisor, and Edwin C. Mackey, apprenticeship representative, USDL. J. Clyde Williams is chairman of the joint apprenticeship committee and represents the IBEW, and Donald M. Larson, manager of the Rocky Mountain Chapter, NECA, is the committee secretary. Each organization has three members and an alternate on the committee. Contractor members are Lawrence Rider, Walter Neill, Larson and Bert W. Stiles, alternate.

The entire state of Oregon is represented in the apprenticeship program there. The Oregon-Columbia Chapter, NECA, has an active committee headed by Stan Adams, who has made it his hobby. He gave a report of the details of the Oregon program and its results to the last District 6 NECA meeting at Santa Barbara.

Los Angeles Chapter, NECA, recently appointed Don Boyer as a full-time coordinator to work with Webb Green, president of Local 11, IBEW, and coordinator for the union. In that extended area the work is divided into six districts, each having a joint committee of contractors and union representatives, with a school coordinator and a representative of the State Division of Apprenticeship Standards. The accompanying picture of the joint committee was taken at the time of presentation of certificates to some 160 apprentices and special honors to one outstanding apprentice in each of the six districts. Richard Arbogast, president of the Los Angeles Chapter, NECA, presided over the graduation ceremonies.

In California a state-wide program has been growing in significance.

Bright young Denver electrician apprentices who were graduated as journeymen at a recent Rocky Mountain NECA, IBEW ceremony

TYPICAL ANACONDA JOINTING KIT contains: lead sleeve, connector, solder, flux, paper pasters, insulating and shielding tape, filling compound, flushing compound, cotton yarn and tape, waste ends—and complete instructions. The kits are easy to order by catalog number.

ANACONDA JOINTING KITS

Here's how to make sure your stockroom doesn't overlook a *single vital item* . . . and your cable-installation crews have everything they need for a specific joint.

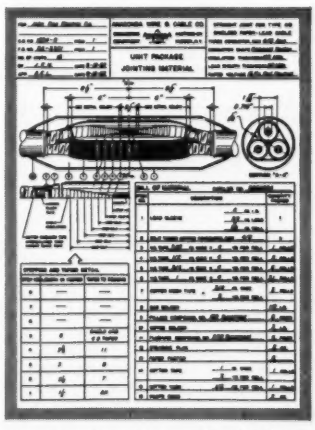
A single forgotten item lies on the stockroom shelf miles away. Your jointer has to stop work!

Someone grabs the wrong material in a hurry. The result is the same—wasted time and labor costs.

The remedy lies in the ANACONDA Unit Package of Jointing Material shown in the illustration above. Here in one conveniently-packaged kit is everything for one complete joint on a specific type and size of cable—impregnated-paper, varnished-cambric, rubber or thermoplastic. The kit is tailored to fit the cable perfectly.

Nothing has been left out. It's complete to a bill of materials and easy-to-follow instructions that assure a neater and better job. Every item has been laboratory- and service-proven—designed by power-cable specialists.

To keep pace with the increasing demand for ANACONDA Accessories, it has been necessary again to greatly increase the facilities of the Cable Accessories Department. This Department is now in a position to promise prompt shipment on most of your orders. Your Anaconda Representative can help you select suitable accessories from our complete line of potheads, insulating compounds, jointing kits, paints, connectors, etc. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 52463



BILL OF MATERIAL and sketch with dimensions are included . . . a handy check-guide for proper jointing technique!

Accessories for all types and sizes of bare and insulated conductors.

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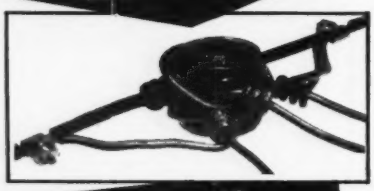
ANACONDA ON THE PACIFIC COAST: Plant at: Orange, Calif. District Offices at: Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash.

Four-In-One
SPOOLS
For multiple service • take-offs

When there's no more room and you get into a MESS LIKE THIS



CLEAN IT UP LIKE THIS!

WITH PORCELAIN PRODUCTS FOUR-IN-ONE SPOOLS

The secondary main alone in the spool groove. Separate dead ending hole for each service drop.

Engineered specifically for multiple service take-offs by a utility engineer with years of practical experience. Saves over a foot of conductor on each drop! Eliminates "feed backs" and reduces possible radio interference. Adequate insulation between each conductor. Saves Labor. Reduces possibility of shock hazards to linemen. Makes possible even distribution of sag. Make service changes or secondary changes without one interfering with the other.

Porcelain Products, Inc.
FINDLAY, OHIO

Late last year a state-wide joint apprenticeship committee, made up of business managers of the IBEW locals and NECA chapter managers, met in Fresno to review progress and discuss improvements to it, set standards of training and discuss wage standards conducive to keeping the best grade of talented young men interested. As a result the California wage standard is high, with beginners getting 50% of journeymen's pay to start. More rigid standards of performance were also set up so as to insure better skilled craftsmen when they turn out.

At this conference W. J. Varley, manager, San Francisco Chapter, NECA, was elected chairman of the state joint committee; S. E. Rockwell, business manager of Oakland's Local 595, vice-chairman; and Fred J. Eggers of Alameda, an instructor and author of an apprenticeship text, secretary. George Ellicott, retired Los Angeles IBEW manager, now chairman of the California Division of Apprenticeship Standards, and several of the staff and members of the State Department of Education also participated.

One of the latest possibilities being explored is the use of television for apprenticeship training of all kinds on a state-wide basis. An application for a channel has been made by the State Department of Education to use for this practical purpose.

NECA

Somewhat of a reorganization of the Utah-Idaho Chapter of National Electrical Contractors Assn. resulted from recent meetings of the members in Salt Lake City and in Idaho Falls. A new manager, Guilbert Frolich, formerly assistant manager of the Heating and Piping Contractors Assn., San Francisco, was appointed and has begun active work to give service to contractors in eastern Idaho and Utah, the chapter area. Frolich is to spend a great deal of time in Idaho and develop the area until such time as contractors there want a chapter of their own and it becomes economically feasible to have one.

Frolich will make his headquarters at the chapter offices in the Zion Savings Bank Building, Salt Lake City. He succeeds G. A. Howarth who resigned on account of illness. Matt Sherwood, Western director for NECA, San Francisco, accompanied Frolich on his initial meetings in the area.

District 8 annual meeting is tentatively scheduled for Billings, Mont., May 15-16, according to Charles Simpson, regional vice-president.

Contractors

Annual meeting of the Idaho State Electrical Contractors will be held in Twin Falls, Idaho, Feb. 13-14. M. E. Shotwell, Shotwell's Utility Service Co. of that city, is chairman of the local committee making arrangements. Among items likely to be discussed are amendments to the state electrical law, dues structure for the organization, hiring of a manager, and other subjects.

APDA

Carroll M. White, Commander USN, addressed the American Power Dispatchers Assn. for the Southwest area Jan. 9 at Burbank on "Practical Aspects of Defense and Disaster Planning" with special emphasis on emergency power supply problems. He directs civilian defense for the city of Glendale. D. P. Bengtsson, area chairman, presided.

EMEA

The second Electrical Maintenance Conference sponsored by the Electrical Maintenance Engineers Assn. of southern California will be held March 18-20, 1953, at the Rodger Young Auditorium in Los Angeles.

H. R. Meyer, manager, maintenance sales department, Westinghouse Electric Corp., will be the guest speaker at the conference banquet Wednesday evening, March 18. He will speak on the importance of maintenance to industry. Special feature will be electrical exhibits by the manufacturers.

Among the conference speakers during the day sessions on March 19 and 20 are R. C. Samuels, American Potash & Chemical Corp.; E. J. Butland, Lockheed Aircraft Corp.; Floyd Mayfield, Standard Oil Co.; E. F. Donatic, Kaiser Steel; Ray Dingler, Monolith Portland Cement; R. J. Kernaghan, Goodyear Rubber; R. H. Disterdick, Los Angeles County; B. J. Hartmann, Flood-Lite Service; H. M. Eversz, McCulloch Motors Corp.; and Foster Sampson, electrical engineer.

The following subjects will be discussed in the conference sessions—maintenance records, planning and scheduling; lighting maintenance; maintenance of electrical equipment in industry; special instruments, tools and methods used in maintenance.

A special field trip through the maintenance department of Kaiser Steel will be conducted Friday afternoon, March 20.

L. J. Rejda, Westinghouse Electric Corp., is chairman of the 1953 Electrical Maintenance Conference.

IAEI

A swing around the West by Charles L. Smith, secretary-treasurer, International Association of Electrical Inspectors, during the month of April will be made the occasion for a series of chapter meetings in sequence. Tentatively the schedule is as follows: Arizona Chapter in Phoenix April 4; Southern California Chapter in San Diego April 8; joint meeting of the Northern California, Sacramento Valley and Central Califonia Chapters at Stockton April 11; Nevada State Chapter at Elko April 18; Utah Chapter at Salt Lake City April 20; Idaho Chapter at Boise, April 22; Oregon Chapter at Portland April 24; Puget Sound Chapter at Tacoma April 25; Eastern Washington Chapter at Spokane April 27; Rocky Mountain Chapter at Denver April 29; Montana Chapter, place not decided, April 30, May 1.

This year all sections of the IAEI are to meet in a joint convention in Chicago the week of Sept. 21 at the Conrad Hilton Hotel. All efforts are being made to have a representative attendance from the Southwestern, Northwestern and Western sections. As a stimulant to such attendance a piggy-bank contest was conducted last year, the piggy banks being used to save money for expenses for the trip.

The Southwestern Section, concurring in the national convention, however voted at its Fresno convention last year to hold an interim informal joint meeting of the various chapters in the section at Santa Barbara July 20-22 at the Mar Monte Hotel. This will take the place of the regular July meeting of the Southern California Chapter and provide an opportunity to discuss code problems before the Chicago meeting and thus instruct those who attend as to the feeling among Western inspectors regarding code matters. H. V. Dobson, city electrical inspector of Santa Barbara, plans a fishing trip for those attending, on the Sunday preceding the meeting.

Aluminum conductor connections to circuit breakers in panels took prominence in the discussion at the Northern California Chapter, IAEI, regular meeting at Tiburon Jan. 17, presided over by M. Bader. Harold Gerber, electrical engineer, showed that no approved connectors are available for making connections of heavy aluminum conductors to circuit breakers at the present time. Underwriters' Laboratories representatives said none had been submitted to them for approval. Gerber pointed out that this situation caused a number of "Rube Goldberg"

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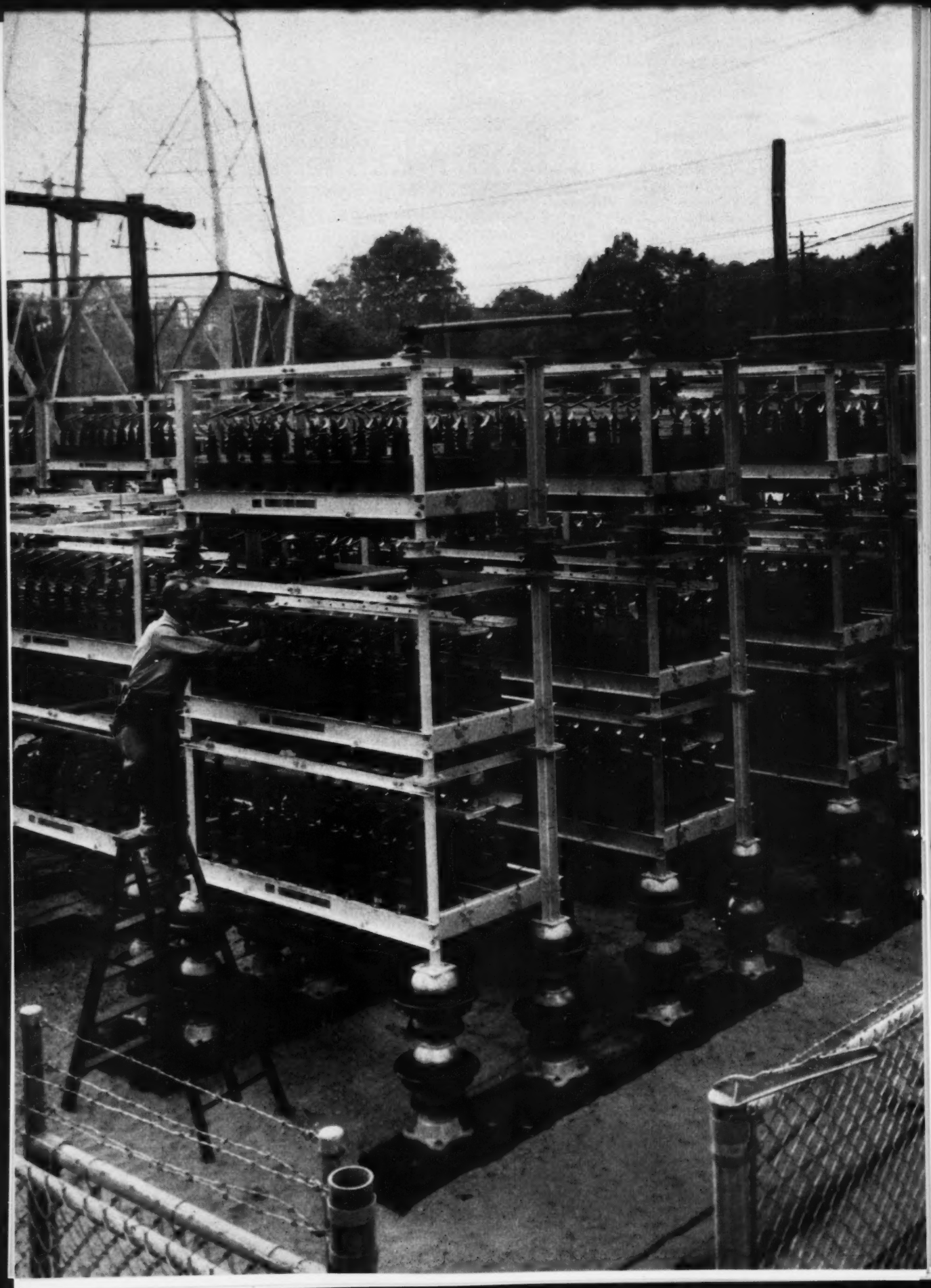


Meeting the Nation's Growing Power Load

Releasing Kilovars for More Active Duty

Today, utility engineers are asking "At what point . . . do you do what . . . to get more kilovars?" Concern about the method of controlling the flow of kilovars to industrial and residential load is the natural result of generating and transforming increases all along the line.

The ability of capacitors to provide solutions to many kilovar load problems is only now becoming generally recognized. Aside from the positive advantages of improved voltage regulation, reduced I^2R losses and reduced operating costs, is the over-all fact that lines and equipment ahead of the capacitors are released for more load. Eliminating reactive amperes also means more efficient power station performance.

Making capacitor applications more practical and attractive are recent developments that have lowered relative costs. Indeed, the cost for all other means of supplying kilovars has increased far more than the cost of capacitors during the last four years.

The capacitor is not a spectacular or complicated piece of equipment as electrical equipment goes, but through the years Westinghouse has made steady improvement through constant research, development and experience. We could point to many development firsts for the capacitor. In this case, we believe that our greatest contribution has been the introduction of new methods of mounting and applying capacitors, which has made their application more convenient, economical and practical in obtaining over-all efficient system performance. This vast Westinghouse utility experience is being constantly applied to the solution of many other important utility problems. J-97170

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Series capacitors quadrupled in size

About two years ago, the road block that had long stymied the use of series capacitors on high-voltage lines was removed. This was the development of a means for shunting excess current, during a short circuit, around the capacitors without removing them from the circuit, and thus losing their value during the critical transient period. This switching arrangement was applied to a 15,000-kva bank of series capacitors at Chehalis, Washington, substation on the 230-kva system of the Bonneville Power Administration.

With the way thus cleared, bigger —much bigger—series capacitors came into view. Early in 1952, an installation more than twice as big—for 46,000 kva—was made, also on the Bonneville system. By the year's end, another one, again almost double in size—85,000 kva—will be placed in service on the Bonneville Power Administration system.

Switching high-voltage shunt capacitor banks

The Indianapolis Power & Light Company recently installed on its system one of the first 34.5-kv capacitor banks in this country.

This capacitor bank, totaling 7290 kva, was part of a program of locating var generation close to var load in the most economical and practical manner. This installation demonstrated that high-voltage, shunt capacitor banks can be switched without exceeding 2.4 times normal phase-to-ground voltage on the bus, a value in the range produced by interruption of short circuit currents.

Capacitor switching phenomena

The toughest job you can put on a breaker is the switching of capacitors. For some time, Dr. Roswell C. Van Sickle has been conducting extensive tests in the Westinghouse High Power Laboratory to determine the phenomena of capacitor switching, the performance of "De-ion®" grid oil circuit breakers, plain-break oil circuit breakers, magnetic blast air circuit breakers, and compressed air circuit breakers. For the complete description of Capacitor Switching Phenomena, write for the AIEE Technical Paper on this subject prepared by Dr. R. C. Van Sickle and John Zaborszky . . . Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Illustration on opposite page

Pictured here is the largest unit in this country of the 69,000-volt rack class. This Westinghouse capacitor application for the Long Island Lighting Company comprises 1005 units for a total of 25,125 kvar.

fitting jobs to be done, to make such connections. At the noon luncheon Lee Hayward, Anaconda Wire & Cable Co., presented a paper by Samuel Rosch regarding the difference between leaded and nonleaded cables. The Uniform Grounding Charts of the Southern California Chapter were presented by E. E. Carlton and a committee was set up to study them for possible concurrence in them.

Clyde Narvaez of Richmond was elected chairman of the chapter; C. H. Hepner, San Mateo County, vice-chairman; and M. K. Bliss re-elected secretary-treasurer.

RMEL

Beginning with a meeting of the executive committee in Denver on Jan. 30, the Rocky Mountain Electric League has set dates for the major meetings it plans this year. Meeting of the various committees will be held Feb. 4 in Denver to plan for the work each is to do this year. The fourth annual Electric Meter Institute at Denver University will start March 23 through 27. The annual Spring Conference will be held at Shirley-Savoy Hotel in Denver April 26-28. The usual joint annual picnic of RMEL-NECA will be held at Elitch Gardens in Denver July 24. The 50th annual convention is scheduled for the Broadmoor Hotel at Colorado Springs Sept. 20-23. O. L. Cheaney, Westinghouse Electric Corp., heads the committee for the meter institute and Prof. A. E. Paige, Denver University, electrical engineering department, will be in charge. The league's Christmas lighting contest in December resulted in over 6,000 homes decorated, 167 contestants, participation by the *Denver Post*, the Junior Chamber of Commerce and RMEL.

Dealers

Salinas Valley Gas & Electric Appliance Dealers Assn. elected for its 1953 officers Kenneth Ahrenkiel, Ahrenkiel Music of Salinas, as president; Earl Albertson, Majestic Furniture, Salinas, first vice-president; Ernest Gnera, Soledad Plumbing & Electric, Soledad, second vice-president; Ellis Langley, PG and E. Salinas, secretary-treasurer; and Maurice Dunn, chairman of electric range section and director, Northern California Electrical Bureau.

Boise Television and Appliance Assn. was formed recently in Boise to do a coordinated job of newspaper, radio advertising and information service to the public with the coming of television to Boise. Appliance dealers, service shops and technicians are included in the group, which elected as its officers Earl E. Haroldsen, Idaho Power Co., as president; Harold Toedtemeier, station KIDO, secretary; Harold Aggler, Boise Music Center, treasurer; and as committee chairmen Bob Fifer of Fifer's, appliances; Cliff Green, Boise Music & Appliance, television; Horace Collins of Collins Radio, service; and J. M. Davidson, station KFXD, information.

PANORAMA OF THE PCEA

At its Jan. 23 meeting the guidance committee of the Business Development Section was treated to a preview of the section's "road show" program. Enlivened by motion pictures and color slides, this fast-moving show is bound to be well attended in each of the eight districts in which it will be presented.

The great amount of time, thought and work that has been given to the preparation of this program has resulted in a concentrated demonstration of the latest ideas in promoting appliance sales, better lighting, better wiring and agricultural and industrial electrification. As a result, a record attendance of dealers and contractors at each showing is expected.

The presentations, themselves, will begin at Fresno Feb. 24 at the Power Building and with a luncheon at the Californian Hotel. Les Quinby and Vern Redman are co-chairmen in charge of arrangements. Next meeting will be at Stockton Feb. 26 at Hotel Stockton, under the co-chairmanship of O. E. Rush, Larry Greer and L. A. Barham. San Jose will have the next meeting at the De Anza Hotel Feb. 27 with Douglas Aiken, Louis Wollenberger and P. S. George as co-chairmen.

The program then will be taken to southern California, with the first meeting at Long Beach civic auditorium March 10. W. E. Weaver is chairman in charge. Next will come a meeting either at Arrowhead Springs Hotel or the Orange Show at San Bernardino March 11, at which J. C. Meserve and Robert Neuman will be co-chairmen.

A jump is made to Phoenix March 17 at Hotel Westward Ho, where Jack Kiedaisch is general chairman. A meeting then in San Diego at the House of Hospitality, Balboa Park, March 20, will be under Chairman Howard Craighead. A final meeting will be held at Reno March 27 under the chairmanship of Dick Pierce.

The program in general will be the same, although different speakers will take the different parts of the program in the various districts. Subjects to be covered will include agricultural load building, commercial and industrial lighting, power and wiring, adequate wiring, home lighting, kitchen and laundry, and television. Additional subjects in some areas will include 4-H Club electricity project and home economics. Residential air conditioning will also be included in some localities.

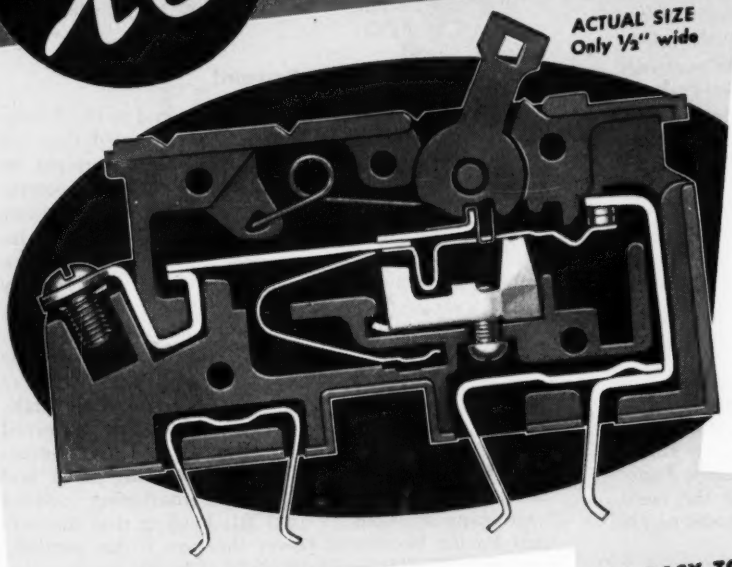
At some of the meetings, a luncheon speaker will talk on an over-all electrical industry topic. In some cases the talk will be given at an evening dinner. Publicity to all members of the association and to the industry of each locality will give a detailed program of speakers, time, and place. The entire program is under V. C. Redman, chairman of the Business Development Section.

Another excellent program is scheduled for the Engineering and Operating Section's meeting March 5 and 6 at Long Beach. Detailed programs should have been received by all concerned by this time. Headquarters for the conference will be the Wilton Hotel, and discussion group meetings will be held in the civic auditorium.

At 11 a.m., March 5, the meeting will open with a general assembly, which will be addressed briefly by President D. D. Smalley. The speaker will be H. A. Lee, Pacific Gas and Electric Co., who is currently serving as Northwest Area representative of the Defense Electric Power Administration. His subject will be the "Power Situation in the Northwest." Speaking Friday, March 6, is Thomas M. Leps, chief civil engineer, Southern California Edison Co., who will address the conference on "California Earthquakes as They May Affect the Utility."

The Jokake Inn will be the locale of the Administrative Services Section's meeting to be held in Phoenix April 8 and 9. This meeting is jointly sponsored by the PCEA and the Accounting Section of the PCGA. The four Administrative Services Section groups that will attend this meeting are: transportation; materials handling of purchases and stores; office forms design and punch cards vs key driven accounting equipment; and program training and orientation of accounting employees.

See XO CIRCUIT BREAKER
FOR LOW-COST LOAD CENTERS



Amazingly Simple —yet All the Features!

Climaxing nearly twenty years' design leadership in the residential circuit breaker field, Square D now offers this new and remarkably simple type of mechanism. Study the sectional illustration at left—see how simplicity of design (only 3 moving parts) provides accurate, positive operation! See how this same simplicity gives you every worthwhile operating characteristic you want in a circuit breaker—without cost penalty!

QUICK-MAKE, QUICK-BREAK at no extra cost and without use of coil springs. Spring shown above merely positions handle—has no function in breaker operation.

Positive Operation insured by action of handle cam directly against contact arm. No spring coupling.

AUTOMATIC RE-LATCHING. Trips to "OFF." The circuit is restored by simply moving handle to "ON."

Compact. 15-20 ampere, single pole units are only ½" wide. 15-20-30-40-50 ampere, double-pole are only 1½" wide, yet accommodate the larger wire sizes.

AMBIENT COMPENSATED at no extra cost. Additional bimetal automatically regulates operation to surrounding atmospheric conditions—prevents needless tripping.

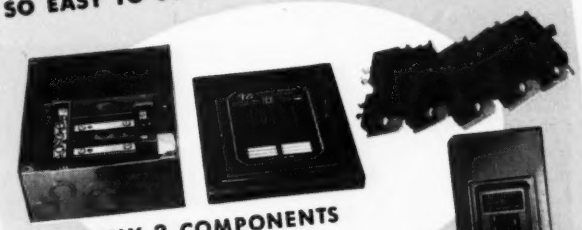
Thermal-Magnetic. 2-way protection against heavy overloads and short circuits.

SHOCK RESISTANT. Simplicity of design, light weight moving parts, and new type spring loading—all combine to make breaker unusually resistant to vibration or shock.

Plug-In Mounting for easy, fast connection to line bus. Steel reinforced, positive pressure clip has been performance-proved on millions of Square D products.

NON-TAMPERABLE ASSEMBLY. Breaker unit width varies with capacity. Impossible to interchange high capacity ratings with smaller sizes.

SO EASY TO STOCK, ASSEMBLE AND INSTALL



ONLY 3 COMPONENTS

- box and interior
- plug-in breaker units
- flush and surface covers

1 TO 32 CIRCUITS WITH ONLY 6 ENCLOSURES

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Watch for Square D's Display Coach—Now on Tour!

THE MONTH IN BRIEF

New WWP Merger Offer Matches PUD Terms

A new merger offer substantially matching the PUD purchase proposal for Puget Sound Power & Light Co. was submitted last month by Washington Water Power Co. It would permit Puget stockholders to take all cash for their holdings at the rate of $27 a share; to exchange share for share for WWP stock; or to take cash for some shares and exchange the others. Under the former WWP offer, Puget stockholders would have received the equivalent of $13.75 in cash, the remainder in stock. WWP President Kinsey Robinson said that he had assurances that the deal could be financed, even though all the stockholders elected to take cash, which would involve nearly $59,000,000. In addition, WWP would assume $20,000,000 in outstanding Puget bonds, a $15,000,000 loan and other outstanding liabilities. Robinson pointed out that a statutory merger would permit Puget holders to exchange for Water Power stock free of capital gains tax so long as 50% of the stock is exchanged. Frank McLaughlin, Puget Power president, stated that a merger would require approval of three regulatory commissions and two-thirds of the stockholders of both companies; that in the meantime Puget stockholders would be taking the risk; that the company will maintain the open-door policy to consummate a proposal from anyone.

Court Tests Set on PUD Purchase Deal

First full-scale court test on legality of the proposed PUD purchase of Puget Sound Power & Light Co. is scheduled for Feb. 16 in Thurston County Superior Court at Olympia. The suit, brought by Kitsap PUD, seeks to enjoin Thurston PUD from participating in the purchase, either by issuance of bonds or other action. It contends that Thurston lacks authority to acquire electric properties in Kitsap County without consent of Kitsap PUD. Judge John Langenback of South Bend, brought into the case when two Thurston County judges disqualified themselves, denied a request of A. E. Blair, Kitsap PUD attorney, that the suit be amended to include the question of constitutionality of the 1949 PUD law. Denial was on grounds that it would delay the decision until after Feb. 27, deadline set in the purchase agreement for consummation of the sale. The judge took under advisement the Kitsap PUD contention that the sale would be void unless it received state PUC approval. Another case questioning legality of the PUD purchase has been scheduled for Feb. 20 in Kitsap County Superior Court at Port Orchard. It was brought by C. E. Ferguson, Kitsap PUD commissioner, against all the districts involved in the purchase agreement.

Court Turns Down Appeal on Pelton Project

Portland General Electric Co.'s request for a new hearing before the state hydroelectric commission on its Pelton Dam project was denied in the Marion County court. Opinion of Judge George R. Duncan upholds the commission ruling of July 11 refusing a preliminary permit licensing construction of the dam and power house. The judge ruled that there is no right of appeal from the decision of the commission, the only requirement being that the commission follow certain steps in calling and holding a hearing. The project has been approved by FPC.

Northwest Power Loads Resumed

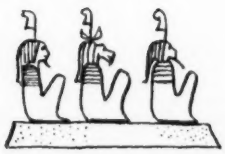
Rain and flooded rivers brought an end to the Northwest power curtailment and it was estimated that full interruptible loads, dropped in September, might be back on the lines by Feb. 15. However, steam generation is still needed to serve interruptible loads, making the cost to industries just short of 10 mills per kwh instead of about 2 mills, the cost with hydro surpluses. Aluminum plants with defense stockpile quotas may recoup excess costs over 4 mills with DPA permission. When the loads were dropped they totaled 380,000 kw. By Jan. 21, a week after half the interruptible was available, the plants had taken back 110,000 kw; were expected to add 30,000 more by Jan. 24. Meanwhile, grievances of private power company customers, forced to carry the cost burden of high steam generation required during the curtailment, were being aired and Bonneville Power Administration marketing policies were being attacked (see p 158). Finding that the current Pacific Northwest power shortage is due partially to "the virtual federal monopoly of major construction and failure of the federal government to authorize construction sufficient to supply the demand of the area," a special power advisory committee of the Seattle Chamber of Commerce recommended regional control of the area's power resources.

High Court to Rule on Colorado Water Rights

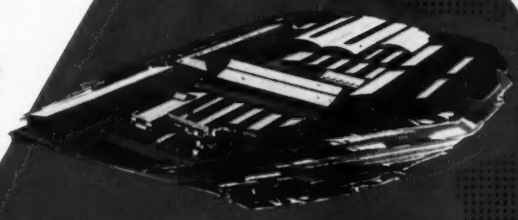
California's legislature has passed a bill making available $100,000 for financing the cost of California's presentation to the U. S. Supreme Court in the Colorado River rights controversy. Until recently California has favored and Arizona has opposed taking the matter to the high court. The way for such action was cleared when the court granted Arizona's motion for leave to file a bill of complaint. The next step will be for California to file its answer to the Arizona complaint. The U. S. Department of Justice has filed a motion for leave to intervene but will not file its complaint in intervention until California has answered the Arizona action.

Limited Rate Increase Allowed HECO

Although a rate increase for Hawaiian Electric Co. approved by the territorial PUC will add $1,125,000 to annual revenues, it is $487,000 short of the amount asked by the company. Largest cut in the company's request was in the residential schedule, where the commission lopped off $230,914, giving a 7.7% increase over present charges. A company request to insert in all schedules an oil fuel clause (passing along to consumers price fluctuations) was allowed only in commercial cooking, heating and refrigeration. The PUC decision came 28 days after its week-long hearing.

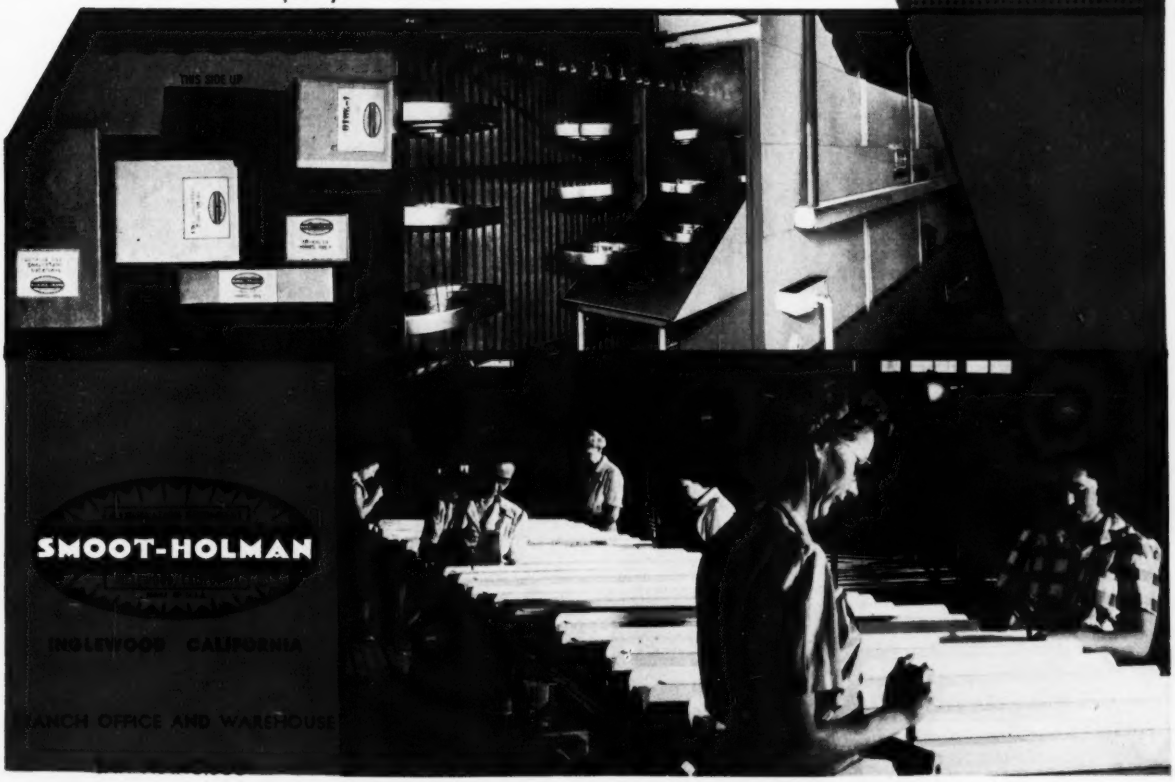


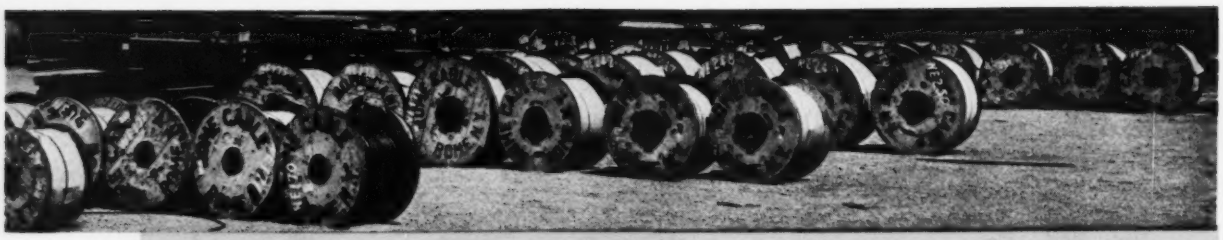
Time Tested

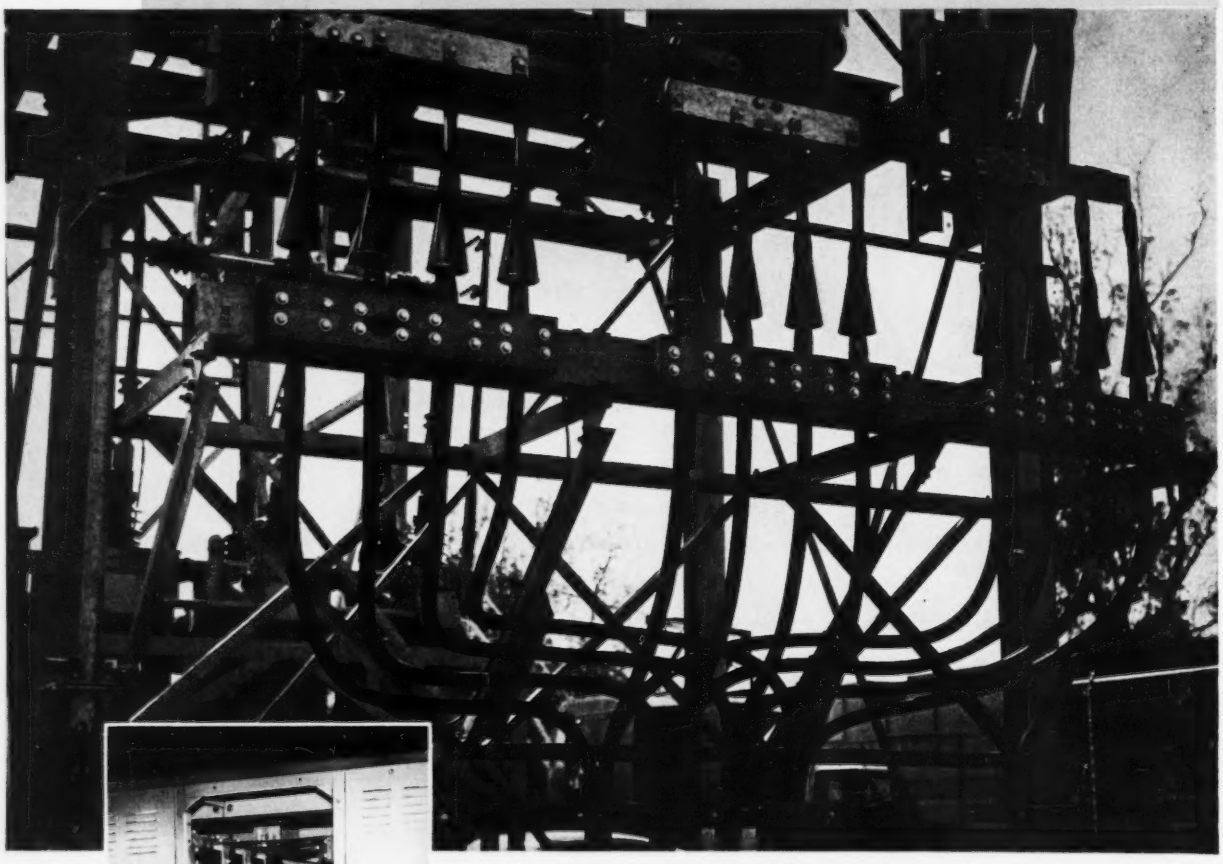


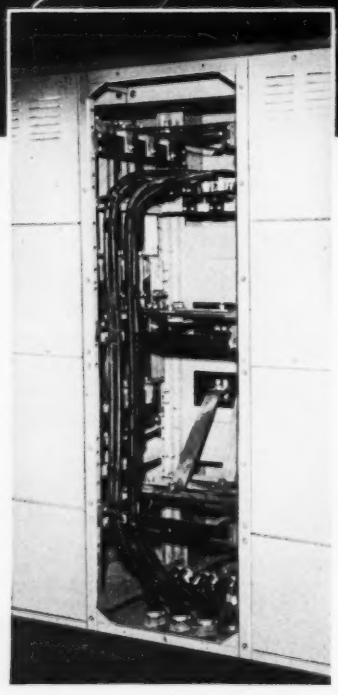
SMOOT-HOLMAN COMPANY

Through the years SMOOT-HOLMAN has continued its progress in better standards of quality and service, ever mindful of the user's benefit. Your lighting standards may be kept in step with production and merchandising trends through the use of SMOOT-HOLMAN lighting. For service and economy ask your Architect and Engineer to specify and your Electrical Contractor to install our quality luminaires.





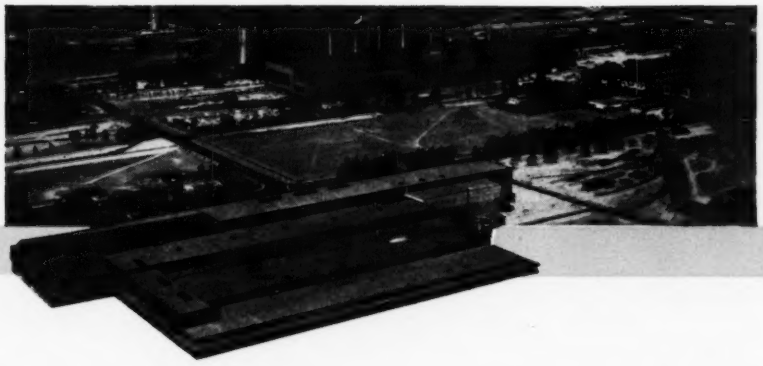




Outdoor connections at switch yard. Note manually prepared terminals.

The 600 volt cable for motor connections and single conductor control cable was RoMarine-RoPrene, style RR-D. All sizes from No. 12 to 1000 CM style RR-D were used for this service.

Multi-conductor control cable in this installation is RoLene (polyethylene) insulated and Rome Synthinol sheathed, described by Rome Cable specification CT-2.



Recently built Kaiser Steel Tin Plate Mill (left foreground), Fontana, California. Capacity is 200,000 tons of tin plate per year.

Electrical Contractor: Kaiser Engineers, Inc.

How Kaiser Steel licked 3 tough cable problems all at once

In selecting power cables for 6.9 KV circuits at its new Fontana Tin Plate Mill, Kaiser Steel Corporation faced three knotty problems:

First, the hazard of acid and alkali corrosion was severe.

Second, the threat of electrolytic action was more than a possibility.

Third, termination and splicing costs were important factors.

Kaiser's choice for this service fell to single conductor, 500,000 CM Rome RoZone-RoPrene shielded power cable, insulated for 9 KV. Two sets were installed to connect the main substation with two 6,900 volt busses in the tin mill proper. Total connected load to the busses was 19,000 HP of M-G motors and 14,250 KVA of transformers.

Why RoZone-RoPrene

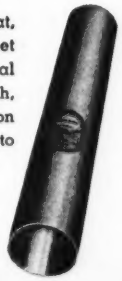
RoZone insulated, RoPrene sheathed cables offer maximum protection against acids, alkalies, oils, greases, moisture, heat, sunlight, and flame. They are non-metallic sheathed and require no lead sheaths with subsequent cathodic protection against electrolysis. Their RoZone (premium quality oil base) insulation provides exceptional resistance to corona action and ozone cutting.

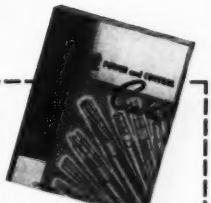
Simple manual terminations eliminate the need for regular wiped potheads. Standard splicing kits only are needed; no costly wiped joints. And the smooth surface of the RoPrene (Neoprene compound) sheath makes for easy working and pulling through conduits and junction boxes.

HELPFUL INFORMATION—Whether your electrical requirements involve special cable designs to meet severe service conditions or simple home wiring, consider the advantages Rome products offer from the standpoint of price and quality. For information that you may find immediately useful, send for the *Rome Power and Control Cable Catalog* illustrated below.

500,000 CM, single conductor shielded, RoZone-RoPrene power cable, rated at 9 KV.

To give wires and cables added protection against heat, moisture, corrosion and abrasion, several thousand feet are encased in Rome • EMT. This is a superior electrical metallic tubing, electrically welded for extra strength, with an electrogalvanized exterior surface for protection against corrosion and a mirror-smooth interior surface to prevent cable injury.





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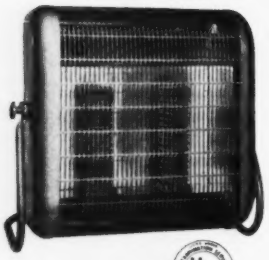

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Fully Adjustable
Adjustable over wide radius so that heat may be directed up or down at will.

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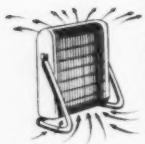

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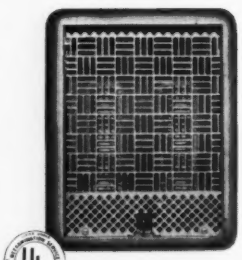
In addition to the radiant heat from the bright copper-clad reflector the Meier Nu-Air unit gives even, warm air circulation at the ideal velocity for quiet comfort.

A Size for Every Need . . . 5 Models!



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Built-in, sensitive thermostat automatically maintains the desired temperature in any room. Just set and forget it.

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Even, warm air circulation, at the ideal velocity of about 200 feet per minute, plus radiant heating, gives gentle, quiet comfort without cold drafts.

Maximum Safety
An added safety feature prevents removal of the grille unless the switch is in the "off" position.

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The grille is easy to remove for complete cleaning. Smartly styled to eliminate all "dust traps".

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THIS MONTH'S NEWS

SURCHARGES FOR STEAM ARGUED IN NORTHWEST

As improved hydro conditions eased the Pacific Northwest's power shortage, pressures were built up by surcharges on billings of private power companies to pay for high steam generating costs during the emergency.

A bill requiring private hearings before such surcharges could be imposed was introduced into the Oregon Legislature by Senator Monroe Sweetland. Senator Warren Gill declared that he would introduce a resolution calling for creation of an investigating committee to look into the necessity of the surcharges. Power companies said they would welcome an investigation.

The over-all power marketing policies of Bonneville came under attack from Thomas W. Delzell, chairman of the board of Portland General Electric Co., who declared that, by refusing to enter into perfectly legal power interchange contracts that would have spread the steam costs equitably over the whole region so that all consumers would bear a fair share, BPA caused the entire burden to be placed on consumers of private power. He stated that BPA has oversold the region's firm hydro capacity, chiefly to one type of industry and without regard to the prior needs of the general consuming public.

The companies were given PUC permission to apply surcharges from 11 to 20% on customer billings to recoup their losses and it probably will be June before they can be removed. Portland General Electric Co. reported last month that excess steam costs totaling about $3,131,000 should be recovered; that normal operating losses can be and are absorbed regularly but that any attempt to absorb a loss as high as the present one would wreck the company's financial stability.

Pacific Power & Light Co. reported Jan. 23 that it is making surcharges only for abnormal costs, which are more than $1,500,000. General Manager George Bragg said January billings brought recovery credits to about $500,000; noted that his company normally absorbs about $1,250,000 of steam generation annually in its base operations.

all along the line....

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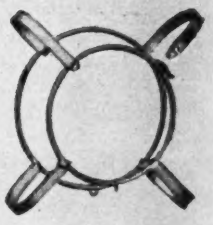
improves performance
simplifies installation
gives longer service life

PLANT OF
MALLEABLE IRON FITTINGS CO.

POLE MOUNTS



JENNE STRAND HOLDERS

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GUY HOOKS

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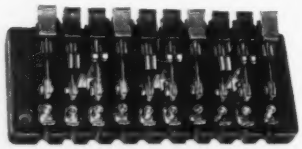
YOU CAN ALWAYS DEPEND ON STATES TEST SWITCHES for performance, safety, value!

Many companies have standardized on States Test Switches because:

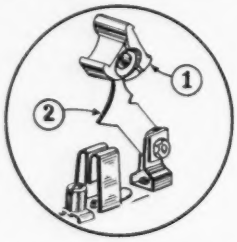
1. No live parts extend beyond base—an important feature.
2. Maximum pressure at jaw contacts.
3. Nickel corrosion resisting finish insures good contact and attractive appearance.



Plus

NEW SAFETY GRIP HANDLE in STATES TYPE "SJK" TEST SWITCHES

Provides easier, safer gripping. New handle mounted on States exclusive angle blade gives sufficient jaw contact.



States testing equipment meets P.U.E.S.R. and National Meter Committee Specifications.

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THE STATES COMPANY
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WASHINGTON STATE BODY STUDIES POWER MEASURES

A bill introduced in both branches of the Washington state legislature would require approval of the state public service commission before public agencies could take over private power properties by condemnation.

To secure such approval the agency would have to prove its existing sources of power were inadequate, that the loss of facilities by the private company would not impair its ability to supply its customers adequately and that the property acquisition was in the public interest.

The bill was introduced in the senate by Lloyd J. Andrews of Spokane, Eugene D. Ivy of Yakima and William D. Shannon of Seattle, all Republicans.

Two other measures proposed by Senator Jack Rogers of Bremerton would require PUDs to call for bids when selling bond issues and provide for a vote of the people on any district proposal to acquire properties of a private utility. Such a vote could be ordered by the PUD commissioners or be placed on the ballot by a petition signed by 10% of the voters in a district.

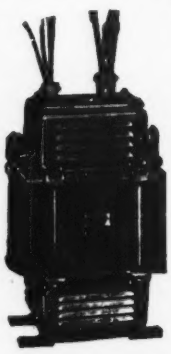
Another bill affecting PUDs was introduced in the state legislature by Senator Harold Kimball, Seattle Republican. It would permit the dissolution of PUDs by a majority vote in the district general election.

The state senate's public utilities committee, headed by Senator Henry Copeland, veteran legislator from Walla Walla, was revamped after Chairman Copeland objected to a nine-man committee, five of whom were expected to favor PUDs. After the Republican Senate caucus upheld Copeland's objection, two senators were added to the committee and one, a public power advocate, was replaced by a conservative Democrat.

● **Visitors** taking guided tours through Grand Coulee and Hungry Horse Dams will be charged a small admission price to pay for the costs incurred. At Grand Coulee the general public will pay a 25c service charge and servicemen in uniform will be admitted free; there will be no federal admission tax.

● **Benton County PUD** of Kennewick, Wash., has ordered plans for a $150,000 office building which would contain 12,000 sq ft of space on one floor. Construction is expected to start in the spring, on a 230x255-ft site yet to be purchased.

JEFFRIES



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When you are installing or rearranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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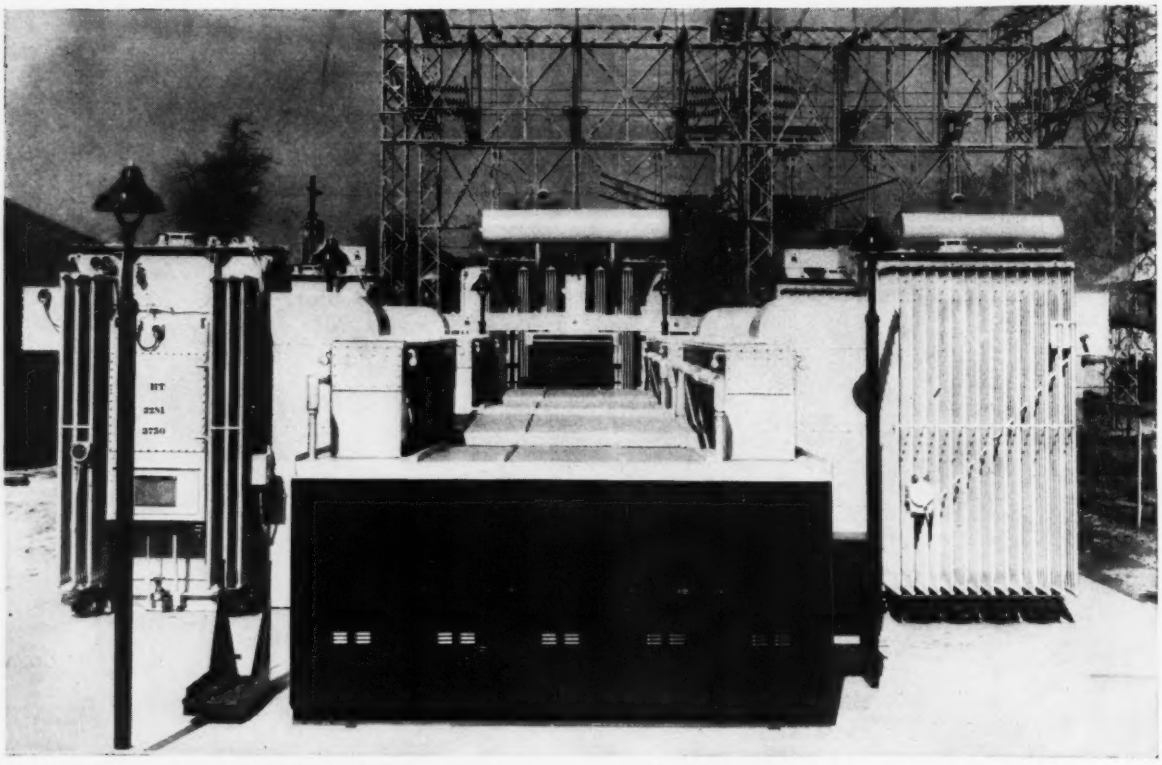
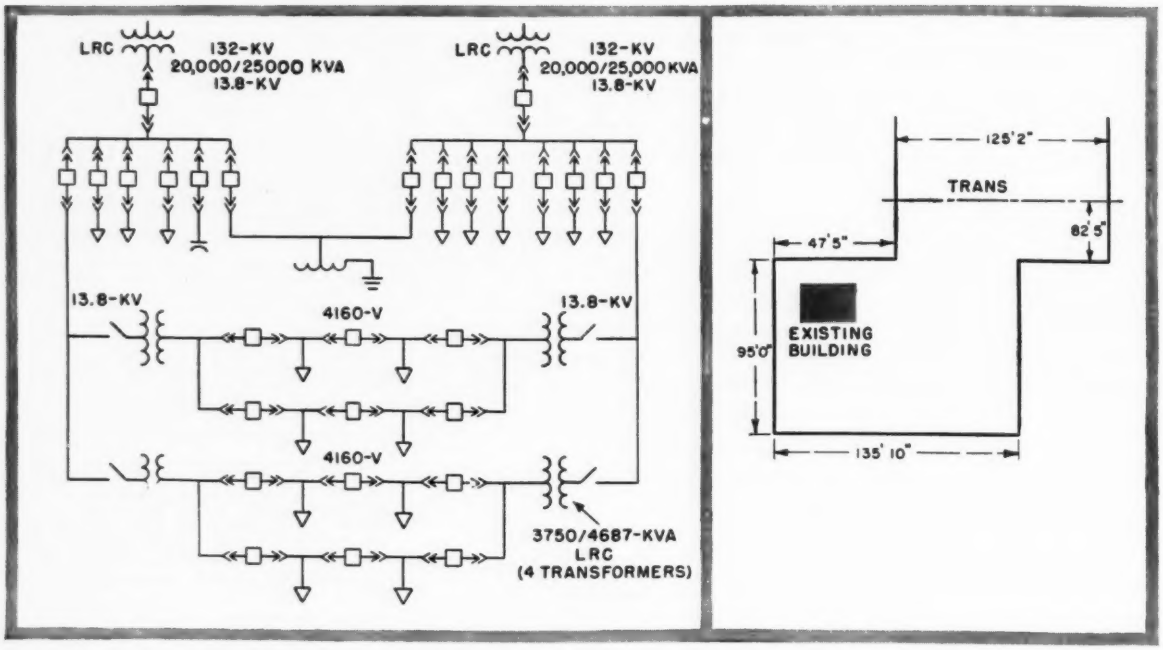
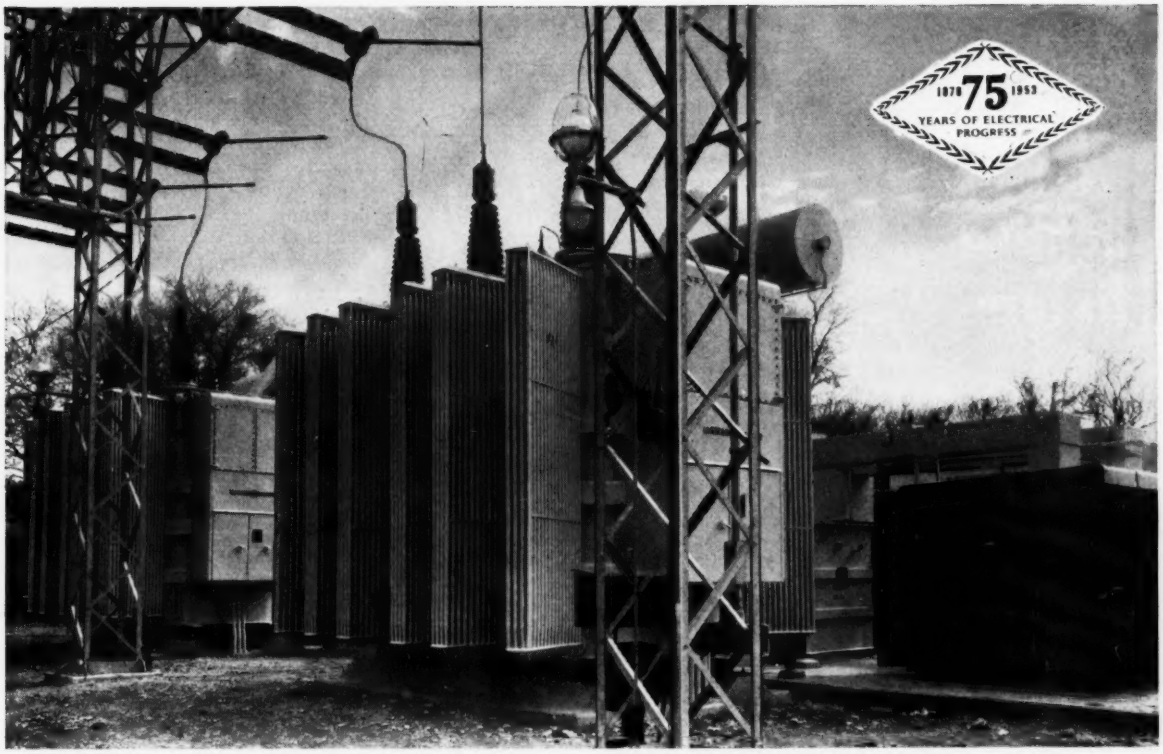


SAN ANTONIO'S 10TH STREET SUBSTATION, one of the largest built by General Electric, is rated at 40,000/50,000 kva, serves its area through nine outgoing 13,800-v feeder circuits in addition to eight 4160-v circuits fed from duplex units.

Utility just draws one-line diagram and



PLANS FOR UTILITY EXPANSION begin with these drawings. A one-line diagram, shown at left, and a simple plot-plan are all that G-E engineers needed to start work on big unit substation for San Antonio. Installation was completed in record time.



LOAD RATIO CONTROL in 25,000-kva transformers provides bus regulation for the 13,800-volt feeders, two of which feed double-duplex units. LRC in duplex units regulates each pair of 4160-v feeders. The substation supplies downtown San Antonio.

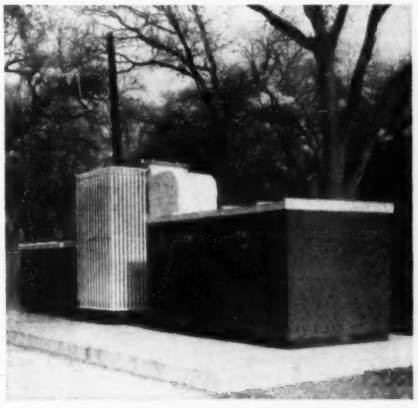
plot-plan to specify 50,000 kva substation

An example of fast, low-cost expansion with G-E unit substations.

The 10th Street substation in San Antonio was planned to feed the city's rapidly expanding system. The utility found it had only to furnish General Electric a simple plot-plan and one-line diagram—similar to those shown at the left—to get the job started fast.

Working from these drawings, General Electric easily and quickly provided a large, double-duplex master unit substation, rated at 40,000/50,000 kva. This standardized equipment answered space requirements as well as the needs of the utility's fast-growing loads.

The City Public Service Board's experience with this G-E substation is further evidence of the trend to standardized equipment in utility expansion programs. G-E unit substations, with their great flexibility, find application in a variety of system arrangements. For full information, write for Bulletin GEA-4500. *General Electric Company, Schenectady 5, New York.* 321-101

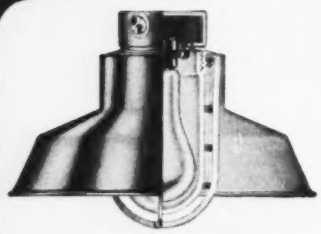


BRACKENRIDGE SUBSTATION: One of 30 similar substations installed on San Antonio's system. G-E equipment simplifies expansion.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MILLER-ADALET
vapor-tight, weather-proof lighting fixtures



extreme flexibility from minimum stock

Interchangeable junction box type, tapped with four conduit hubs so that E, C, L, T, and X fittings can all be wired with the one type unit.

WON'T RUST OR STREAK WALLS — precision-built to stand up under severe service conditions, with cast aluminum bodies of high tensile strength.

GUARDS OF CAST ALUMINUM ALLOY are mounted to bodies with unique locking device, but easily removable — CAN'T "FREEZE" OR SHAKE LOOSE.

RESILIENT NEOPRENE AND CORK GASKETS are oil and gas proof — contain no volatiles — won't dry out in service.

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MILLER field engineers and distributors are conveniently located for nation-wide service.

SMUD SIGNS 40-YEAR CONTRACT WITH USBR

A 40-year power contract was signed in Sacramento, Calif., recently by the Sacramento Municipal Utility District's board of directors and Richard L. Boke, representing the Bureau of Reclamation.

The contract, effective July 1, 1954, replaces one now in effect between SMUD and Pacific Gas and Electric Co.

The contract, providing for a maximum of 290,000 kw, was the eighteenth signed by the bureau for delivery of Central Valley Project power to public agencies. In each case except one, the PG and E has agreed to wheel the power for 1 mill per kwh of energy delivered, plus 5% lost in transmission. Payment is in power fed into the company's system. The exception is the Port Chicago Naval Magazine, which receives power direct from a CVP transmission line in Contra Costa County.

Actually 350,285 kw of CVP power have been contracted for to date, according to the bureau, although the present CVP firm output from Shasta and Keswick plants is roughly only 300,000 kw.

When the Folsom and Nimbus plants on the American River are put on the line in late 1954, another 100,000 kw of firm power will be available. This would make a total of 400,000 kw available. Also to be taken into consideration is the bureau's pledge to deliver 33,000 kw to the Colorado River Commission of Nevada by next June 30, provided the commission can make arrangements for its delivery from the CVP load center near Tracy, Calif.

Actually this makes more than 383,000 kw committed by the bureau for a firm supply now totaling only 300,000 but which will climb to 400,000 when the Folsom and Nimbus plants begin producing late in 1954.

The bureau points out, however, that the present needs of SMUD are 140,000 kw, that the 290,000-kw maximum will not be reached until 1959 or 1960 and by that time Folsom and Nimbus and possibly additional CVP power plants will be working.

The new SMUD-bureau contract will run for 40 years beginning with the date power is first supplied. Present plans call for power to be wheeled over PG and E facilities beginning July 1, 1954, pursuant to a contract with the bureau whereby PG and E receives a fee for such service.

The 4½ mills per kwh average contained in the contract reportedly will result in approximately 17% lower cost than the rate which SMUD has been paying. Last year SMUD's wholesale power bill was about $3,500,000.

The bureau rate is firm for a period of 10 years. After that time it may be adjusted at five-year intervals in accordance with charges in costs experienced by the CVP, subject to certain conditions.

In addition to the 290,000 kw specified in the contract, the district has an option on a part of the power from future units of the Central Valley Project.

Joint Program of Large Hydro Projects Studied

Anticipating eventual withdrawal of the federal government from the power business, municipal utilities at Seattle and Tacoma, Wash., are cooperating with PUDs of the area in planning a joint program of large-scale hydroelectric projects.

This report came after a meeting by Gov. Arthur B. Langlie with E. R. Hoffman and J. Frank Ward, superintendents of Seattle and Tacoma City Light operations; C. A. Erdahl, Tacoma commissioner of public utilities, and Bob Jones, chairman of the Seattle City Council's utilities committee. The city officials said they previously had been consulting with PUD officials.

The discussions have not yet dealt with specific projects although Hoffman commented they would be "large projects," since the cities and PUDs already have the authority to deal with projects that they can handle individually.

Langlie also has met with PUD officials and expects to meet soon with representatives of privately owned power companies.

"Out of these meetings will come a power policy and program pointing toward more effective cooperation with the new national administration, ironing out difficulties we find in our area and bringing the region together for a sound, integrated power operation," said the governor.

Langlie indicated he would seek changes in the law setting up a state power commission, which he never appointed, and that he also might propose legislation authorizing construction of steam power plants.

● **Tacoma city council** has approved an emergency ordinance appropriating $30,000 to $40,000 for repairs to the city's No. 2 steam generating plant. Because of the power shortage, the work will be done at once, without calling for bids.

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Roebling ROEPLASTIC Control and Signal Cables are ideal for such purposes as remote control of motors, switch gear, automatic machinery, etc.... for traffic light control, relay, metering and supervisory circuits. They are made in constructions, types of insulations and over-all sheaths to meet every specific requirement. Write for technical data... and order ROEPLASTIC Control and Signal Cables from your Roebling distributor. John A. Roebling's Sons Corporation, San Francisco–Los Angeles–Seattle.

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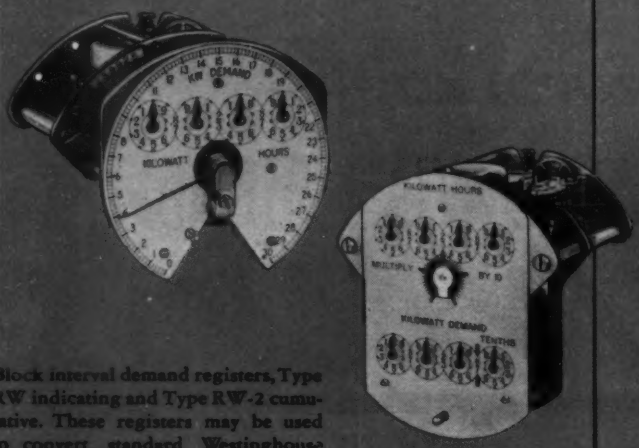
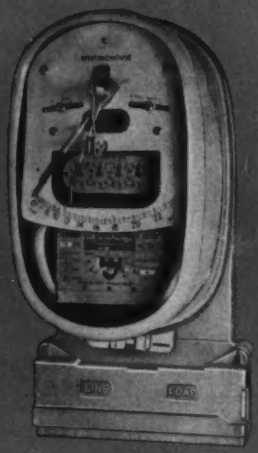


Block interval demand registers, Type RW indicating and Type RW-2 cumulative. These registers may be used to convert standard Westinghouse Watthour Meters to demand types.

CAH and CSH single-phase, combination watthour and thermal demand meters. In the Type CSH a 50-ampere meter with 48-kw (200-amp) full-scale rating is available.

CSH and CAH polyphase, combination watthour and thermal demand meters. CSH-8 is the first polyphase meter available for socket mounting.



KCA polyphase, combination watthour and thermal kva demand meters . . . available for all services under all conditions of current, voltage and power factor.

QCS and QCA single or polyphase, combination watthour and thermal ampere demand meters . . . available in all standard ratings.

GET COMPLETE INFORMATION...

Complete details, including operating and construction features, application information and wiring diagrams, are contained in individual catalogs covering each of the meters shown here. Ask your Westinghouse representative for copies or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Type RW (Indicating) Demand Registers . . . C.S. 42-315

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Type KCA Combination kva Demand . . . C.S. 42-340

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- **for every circuit**
- **for every rate**
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Here are the answers to all your needs for less costly metering of kw and kva demand. It's a *complete* line of Westinghouse Demand Meters, engineered specifically to shave your specialized metering costs. In every case the designs are . . .

Simple . . . only a minimum number of moving parts. Block Interval types are used with standard Westinghouse Meters. Thermal demand elements are combined with conventional watthour meters.

Compact . . . no larger than a 3-element watthour meter except for increased depth.

Easy to install . . . just one mounting for both watthour and demand meter . . . connections are interchangeable with standard watthour meters.

Easy to maintain . . . in all units you'll find the same low maintenance characteristics you enjoy in Westinghouse Standard Watthour Meters.

Specific examples of Westinghouse pioneering in pace with your needs include: the first polyphase, combination thermal unit in a socket base; the first and only combination polyphase watthour and thermal kva demand meter.

It is the kind of skillful, pace-setting engineering that stands behind every meter that Westinghouse builds today. It's another good reason to always specify . . . Westinghouse. J-40425

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

SOAPSTONE *SUPERIOR* CONDUIT

New Flat-Sided Conduit Simplifies Underground Construction

The picture shows construction work on the first duct system in Northern California to be erected with the new flat-sided SOAPSTONE conduit. This 8-way system was laid in record time by a contractor who had never done underground work before! Engineers and construction men who watched this job were amazed at the time and manpower savings possible with this new design, as well as with the simplicity of erection.

Powerful new extrusion presses make this strong flat-sided conduit possible. Years of underground experience and research have gone into its development. It may be stacked as shown above when no separation between ways is needed. Any spacing desired is easily obtained by use of simple, inexpensive block-type spacers.

Low first cost, less handling on the job and faster laying mean that no extra money is buried underground when you use SOAPSTONE superior conduit.

The smoothest of all conduits, SOAPSTONE is easiest on cables. Rapid heat dissipation, chemical inertness and inherent long life assure permanent circuit protection.

You should have all the information on this new Flat-sided SOAPSTONE. Write or call for prices, specifications and installation details.

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SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California — Factory: Oakland, California

PERMANENT CIRCUIT PROTECTION

NRECA FEARS LOSS OF PREFERENCE CLAUSE

Immediate objectives of rural electric cooperatives must be continuation of building programs, improvement in cooperative management, preservation of the preference clause and support of the new administration, declared Clyde T. Ellis, executive manager of the National Rural Electric Cooperative Assn., at the annual convention of that group held in San Francisco Jan. 26-29. The greatest factor in keeping down wholesale power costs to REA borrowers has been REA's authority to make loans for generation and transmission, said Claude Wickard, REA administrator.

Two speakers warned of the "imminent danger" to the preference clause, Alex Radin, general manager of the American Public Power Assn., and Henry Jackson, democratic senator from Washington. Radin said that the preference clause stands in the greatest danger it has faced during its period of existence and that there is an ever increasing clamor by private utilities against preference policies.

Success of the REA program depends on federal generation and transmission or, in lieu of federal lines, "decent wheeling agreements so that you can get power at fair and just prices," Jackson declared. Jackson urged that public agencies participate in research on atomic power generation so that they can make energy available to their cooperatives from this new power source when it comes into being in the relatively near future.

Included on the convention agenda were a number of panel discussions on problems of the co-ops. Registration was 4,400.

Governor Asks New Funds to Study Feather River Project

Gov. Earl Warren has asked the California legislature for $750,000 to further studies on the proposed $1 billion Feather River water and power project. Of that amount, $125,000 is scheduled for the negotiation of contracts for the delivery of irrigation water and electric power.

The new appropriation would be in addition to $800,000 being spent on Feather River investigations during the current year. The state-sponsored project would include a dam and power plant on the river near Oroville, with a system of canals to carry stored water to water-short areas in southern California.

PROSPERITY IN THE USA: How Wealthy Are We?

Again, how prosperous *are* the people of the United States?

This is the third of a series of messages devoted to this crucially important and much-debated question. The first two messages dealt with what has been happening to our national income, both in terms of its growth and how it is divided among individuals.

This third message deals with what has been happening to the resources—factories, farms, mines, and equipment of all kinds—out of which income is created. It deals with what economists call our wealth.

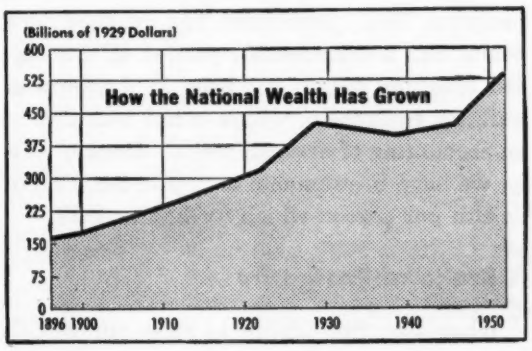
It is possible for a nation to enjoy apparent prosperity for a time by rapidly exhausting its resources. But to sustain prosperity over the long pull a nation must see that its wealth is not dissipated. Hence what is happening to our wealth now is a harbinger of what is going to happen to our prosperity later on.

How Wealth is Measured

It is often asserted that the most vital element in a nation's wealth is its people. There is a lot in this idea. For example, the full value of a country's hospital and surgical equipment depends on its physicians and their skill in handling the equipment.

However, no one has ever devised a satisfactory way to put a value on human beings. So people are omitted from calculations of national wealth. So, too, is military equipment. It is regarded as basically destructive and hence not a real addition to wealth. Otherwise, the wealth of a nation is calculated in terms of the dollar value of its physical resources.

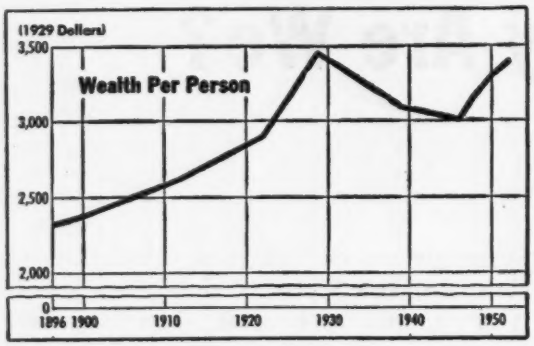
The following chart shows the wealth of the U.S.A. at various intervals during the past 50 years. For the period through 1948 the figures come from a pioneering study by Raymond Goldsmith of the National Bureau of Economic Research, which is widely regarded as the foremost organization in its field. The figures since 1948 are estimated. To remove the effect of price changes, all of the wealth figures are calculated in 1929 prices.



From this chart one fact stands out clearly. It is that since 1929 our national wealth has not been increasing as steadily as it did during

earlier periods. Indeed, in 1946 our total national wealth was actually less than it was in 1929. Only in the last six years have we been able to make any consistent additions.

Even these gains are less impressive when the growth in our population is taken into account, as illustrated by the following chart.



This chart makes it clear that when the nation's wealth is divided by the population, we are slightly worse off per person today than we were in 1929. This is the case in spite of the large additions to our national wealth since 1946.

Depression and war are the two principal reasons we have made no progress in increasing our wealth per person since the 1920s. The depression brought mass unemployment and greatly reduced production which ruled out any increase in wealth. During World War II and again during the post-Korean mobilization program, U.S. production has reached new peaks. But a considerable portion of this record breaking output has been in the form of military equipment, which is not included in an accounting of national wealth. Consequently, we have been unable to regain the level of wealth per person which we had in 1929.

A Brake of Prosperity

What does this failure to raise our wealth per person mean? It means that we have fewer resources with which to create income for each individual. It means that we have made no progress in the crucial task of assuring future increases in prosperity.

As the second editorial in this series demonstrated, we have gone so far in equalizing individual incomes that "the possibilities of increasing the income of the rest of the people by 'soaking the rich' have largely disappeared." From now on the only promising way to increase our individual incomes is to increase our national earning power.

During the past four years it has taken about $3.60 of national wealth to yield $1 of income after taxes. This is a low figure for the wealth needed. Prior to World War II there were long periods when it took at least $5 of national wealth to produce $1 of national income. The experts in this field are by no means certain that it will not again take $5 rather than $3.60 of wealth to increase income by $1.

But let us assume that $3.60 of wealth will suffice to provide $1 of income in the years ahead. If by 1960—seven years from now—the income of the average American is to be increased from about $1490, where it stands at present, to $2000, we must add $310 billion to the national wealth. This is nearly three times as much as we have added to our wealth since the end of World War II, seven years ago.

Because we have made large additions to our productive equipment in recent years, fears are frequently expressed that we shall soon be plagued by an excess of such equipment. But the facts about our national wealth do not support this conclusion. They indicate that we still have ahead of us a tremendous job of increasing our resources if the American standard of living is again to resume the steady climb which was interrupted by depression and war.

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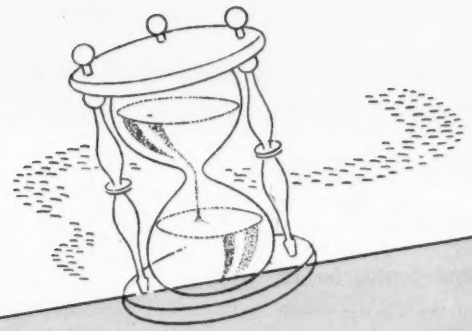

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TIME IS THE MEASURE OF ALL THINGS. FEW OF MAN'S INVENTIONS CAN STAND ITS MERCILESS JUDGEMENT. YET KERITE FOR OVER 90 YEARS HAS THRIVED AND SPREAD AND GAINED THE CONFIDENCE OF THE USERS. TIME, INDEED, GIVES KERITE ITS UNQUALIFIED RECOMMENDATION.

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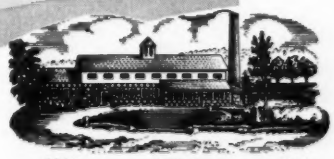

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Overhanging branches removed and trees shaped properly for Utility in Beverly Hills

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

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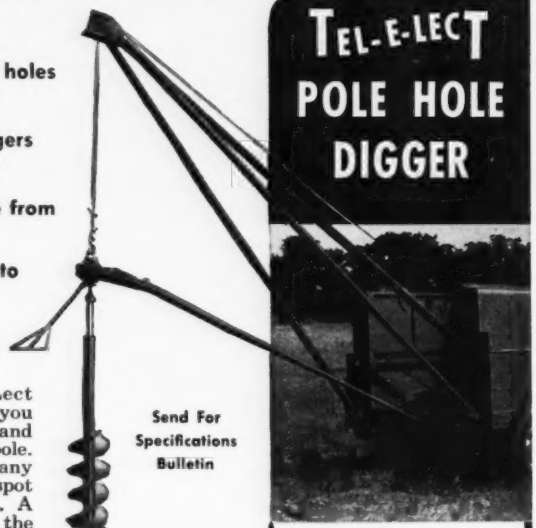
Operates **ON ANY DERRICK TRUCK**

- Adjustable for clean holes to 8 ft. deep
- Interchangeable augers 8" to 20" diameter
- Drills a straight hole from any truck position
- Easy to use—easy to transport



WITH the Tel-E-Lect Pole Hole Digger, you use the same truck and crew that sets the pole. You can drill a hole any place that you can spot the pole derrick. A single bolt attaches the digger to the truck; it works suspended from the derrick. Powered by the truck motor through a power take-off shaft, Tel-E-Lect digger is raised and lowered by the winch line. Fits the budget of even the smallest utility or contractor, and quickly pays for itself.

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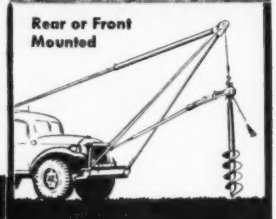

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SUBSIDIARY MERGED WITH ARIZONA PUBLIC SERVICE

Merger of Northern Arizona Light & Power Co. with Arizona Public Service became effective Dec. 31 following FPC approval.

The action brings under the Public Service name its wholly owned subsidiary and enables the parent company to consolidate books for both utilities.

The northern properties became a subsidiary of Central Arizona Light & Power when they were purchased from Arizona Power Co. in 1949. They remained a subsidiary on merger of Calapco and Arizona Edison into Arizona Public Service last March.

Headed by Henry B. Sargent, the combined Public Service system provides electricity for nearly 120,000 customers throughout the state, natural gas for almost 100,000 customers in central and southern Arizona, and domestic water for more than 14,000 in the southern part of the state.

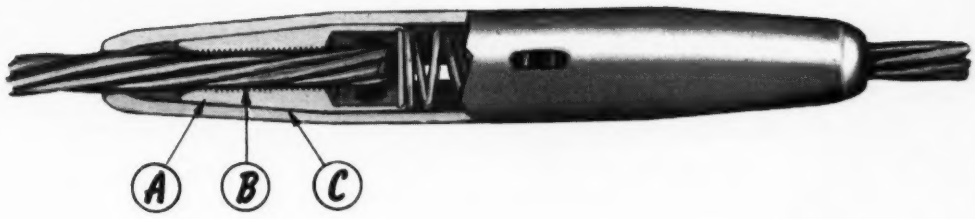
Part of the Public Service State division, the territory is supervised by W. P. Reilly, vice-president. Malcolm M. Bridgwater will continue as general superintendent of the northern area. District offices are maintained at Prescott, managed by Earl Mayer, and at Winslow under L. R. Kimmich.

● **A 6% wage increase** is written into a new contract between Grays Harbor PUD, Aberdeen, Wash., and Local 77, IBEW. In announcing the agreement Jan. 7 management and the union reported it would put journeymen's hourly rate at $2.65—up 15c—and be retroactive to Jan. 1. Minor adjustments in the contract, to expire Dec. 31, involved classifications for maintenance and meter reading.

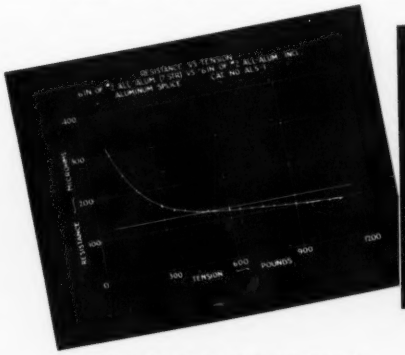
● **Power rates** of the Salt River Power District in central Arizona have been increased approximately 2% to compensate for increased costs of natural gas supplied the district by the El Paso Natural Gas Co. for generating purposes. The move follows a similar hike by Arizona Public Service which upped power rates 1.4% and gas rates 5.7% for the same reason.

● **Arizona Public Service** Co. has been granted a rapid tax write-off on its planned $14,000,000 development near Red Rock, midway between Phoenix and Tucson. The company will depreciate 40% of the investment over a five-year period. The remaining 60% will be depreciated over the normal 30-year period.

ALUMINUM "AUTOMATICS"... for ALUMINUM CONDUCTORS

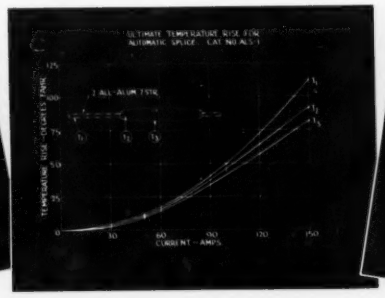


Above is the Fargo Aluminum Automatic Line Splice. The "one-piece" jaw—indicated by "A"—assures permanent alignment of jaw segments for strength . . . holding power . . . and ease of installation. At point "B", the teeth of the jaw penetrate the high resistant aluminum oxide on the conductor surface; at point "C", the external contact surface is wiped clean as tension is applied. This automatic cleaning action assures better resistance contacts, which are kept clean and low by Fargolene* inhibitor, with which all aluminum splices are factory packed. Strengthwise, the splice will develop—on 7 strand all-aluminum—full rated strength of the conductor, and between 70% and 85% on 19 or 37 strand, depending on conductor size and stranding. Accelerated vibration tests show results comparable to the performance of copper splices and conductors.



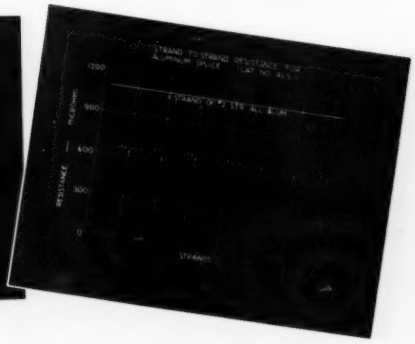
RESISTANCE LOWER THAN CONDUCTOR

Under average operating tension the resistance of the Fargo Aluminum Automatic Line Splice is less than an equal length of cable. The graph shows the resistances of the splice and an equal length of cable plotted against tension.



HEATING LOWER THAN CONDUCTOR

Because of the low resistance shown in Graph 1—plus larger radiating surfaces and larger cross-sectional area—the ultimate temperature rise of the splice is less than that of the cable. (T_1, T_2 and T_3 indicate location of thermocouples for testing.)



ADEQUATE INTER-CONNECTION AMONG STRANDS

Inter-connection between strands in highly essential in aluminum. The graph shows resistances between strands on each side of the splice, as compared with the resistance of an equivalent length of a single strand.

*"*Fargolene*" is a non-corrosive, water repellent, non-conducting grease inert to metals and plating. It remains in position up to 350° and is workable at sub-zero temperatures.

Ask your Line Material Field Engineer for complete details.

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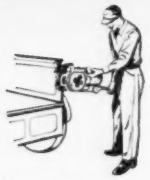

Here is a power pipe threader you can carry to the job in one hand. Weighing only 26 lbs., Port-A-Pony offers efficient pipe and conduit threading on all installation and maintenance work. You'll like the way Port-A-Pony threads any ¼" to 4" pipe on the job. The ½ hp reversible motor operates on 110V, AC or DC. Use your present die stocks.

Write for full information today.

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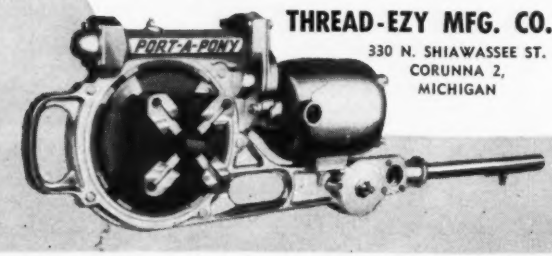

FIRST ROSS GENERATORS ARE NOW ON THE LINE

Hydroelectric output of Seattle City Light was increased 70,000 kw Dec. 30 when the first of three 90,000-kw generators in the new Ross power house went into production. The unit is not able to generate at capacity because of the limited water supply behind Ross Dam, the result of low stream flow. The two other units are scheduled for installation by next August.

While Ross Dam has provided storage for the Diablo and Gorge plants for several years, the operation of the first Ross generator is the initial power production at the dam site. The dam and power house will represent an investment of $41,000,000. Under consideration for the future is a 125-ft addition to the 540-ft dam and addition of a fourth generator.

Folsom Dam Construction Delayed When Barrier Breaks

A 40-ft-high earthfill cofferdam at Folsom Dam on the American River in northern California burst Jan. 9 under pressure from heavy rains, causing damage estimated in excess of $350,000.

Failure of the barrier had been anticipated and most equipment moved out of the way but the Sacramento District Corps of Engineers had hoped it would hold until later in the winter.

J. R. Morton, chief construction engineer for the district, explained that if the dam had held for two more weeks work would have reached a point where damage would have been minor and months of progress gained.

The structure had been used to divert the river through a 1,000-ft tunnel while concrete pouring proceeded on the base of the dam. The break halts construction on this phase of the contract until early summer, when the barrier can be rebuilt.

● **Baldwin-Lima-Hamilton** Corp., Philadelphia, was low of four bidders for manufacture and delivery of hydraulic turbines for The Dalles Dam power house when offers were opened Dec. 2 by Portland District Engineers Corps. Low was $20,025,770 for fourteen 123,800-hp turbines and $8,683,850 for six turbines. Col. T. A. Lipscomb announced he has requested authority to award contracts on the basis of 14 units instead of six in order to bring down average per unit cost.

NEW OPPOSITION RAISED TO PUD HYDRO PROJECT

Grant County PUD of Ephrata, Wash., has met new opposition to its plan to construct a $412,000,000 dam across the Columbia River at Priest Rapids.

First opponent was the Corps of Engineers, whose project to dam the river at Priest Rapids antedates the PUD proposal. Newest opponent is reported to be the Atomic Energy Commission, which believes the dam would endanger its Hanford Works not far downstream.

Glen Smothers, PUD manager, and Axel Strom, the PUD's industrial utilization director, plan to ask Congress to set aside the authorization previously given the corps for the project.

The AEC is reported to feel that the dam could be reduced to rubble in an instant under an atomic attack, releasing a wall of water more than 150 ft deep if present plans are adopted. The flood would inundate Hanford plutonium piles so rapidly that a shutdown could not be accomplished in time to avoid a second catastrophe, AEC consultants believe. It would flood Pasco, Richland and Kennewick before their residents could seek higher ground.

Hanford officials are making an independent survey to establish a safe maximum height for the proposed dam, said David F. Shaw, manager of Hanford operations for the AEC.

Power District Starts Work on Kyrene Addition

Work on a $13,500,000 steam plant addition to the Salt River Power District's Kyrene plant has been started with a completion date set for June 1954. The new 36,000-kw unit will more than double the generating capacity of the 30,000-kw plant put into operation last year. The addition will be of the same general design as the present plant with six-story walls and semioutdoor installations. Construction contract is held by the Bechtel Corp.

● **Skamania County PUD** of Stevenson, Wash., has purchased power lines serving some 105 customers in the Upper Washougal area of the county from the PUD of neighboring Clark County for $34,754. The sale price was based on a 1946 inventory and subsequent improvements, according to V. M. Cleaveland, Clark PUD manager.

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PLP

DEPARTMENT PLANS ARE APPROVED BY ENGINEERS

Over-all plan of the Los Angeles Department of Water & Power to build a large receiving station in west San Fernando Valley, fed by high-voltage transmission lines, is a necessary addition to the power system, according to the report of engineers hired by the California legislature to investigate the project.

Gilbert D. McCann and Royal W. Sorensen, professors of electrical engineering at CIT, prepared the report, which was submitted to the legislature by the assembly interim committee on public utilities and commissions.

The plan offers less disturbance to the owners than use of the 34,000-v circuits feeding into the area from a station outside; the ultimate required number of such lower-voltage circuits would be very great and provide unsatisfactory service, the report concluded.

Residents of the area favored an underground system and carried on an intensive fight against overhead lines. Cost of the overhead system is estimated at $11,000,000, of the underground at $29,000,000.

McCann and Sorensen point out that the department based its planning on the premise that overhead lines would be used and that if the system had been planned for underground circuits it is probable that the cost differential would have been $14,000,000 instead of $18,000,000.

● **Tacoma's city council** has been urged by C. A. Erdahl, public utilities commissioner, to approve installation of a 20,000-kw steam turbine generator at the city's No. 2 steam plant. Present capacity of the city's two steam plants is 40,000 kw. The project could be completed by February of 1954 at a cost of $2,000,000, Erdahl told the council. Steam would be supplied by the existing boiler.

● **City of Seattle** has filed suit against an electric service business bearing the name of City Light Electric Co. The suit charges that use of the name tends to confuse the private business with Seattle's municipally owned City Light. The business is operated by Fred Engel.

● **A $445,000 loan** which it has just secured from the REA will be used by the Ferry County PUD of Republic, Wash., to construct 116 miles of new line connecting 140 new rural customers in Ferry and Okanogan County, as well as for system improvements.

For customers who prefer to pay bills in person but cannot visit the office during business hours, Hawaiian Electric Co. has installed an outdoor deposit box as a "silent cashier." The depository includes a drop-box and writing desk, with fountain pen attached, envelopes and blank checks

B. C. Committee Will Study Columbia Developments

Establishment of a special committee of seven to study water and power developments in the vast Columbia River basin of British Columbia has been decided upon by the B. C. government. Special attention will be given to the request of the United States to form storage facilities in the Canadian area to permit power developments south of the border.

With Lands and Forests Minister Robert Sommers as chairman, the committee includes: Kenneth Kiernan, agricultural minister; Robert Bonner, attorney-general; W. D. Black, provincial secretary; S. R. Weston, B. C. Power Commission chairman; Robert G. Anderson, general manager of the West Kootenay Power & Light Co.; Thomas Ingledow, vice-president and chief engineer of B. C. Electric Co.

The Premier said the committee will act voluntarily until it can be set up as a permanent body under special legislation at the coming session of the legislature.

Its immediate problem will be to study the full implications of the United States request for permission to build a giant dam on the Kootenay River at Libby, Mont., which would flood 13,000 acres of land on the B. C. side of the border.

For this reason, the Premier said, it was urgent that the committee start its studies immediately.

ALASKA RECONSIDERING PLANS FOR STEAM PLANT

A statement that the Bureau of Reclamation would accept responsibility for power generation in the Anchorage, Alaska, area has led Anchorage city officials to reappraise their plans for proposed construction of a $3,500,000 steam generating plant. The statement was made by Joseph Morgan, district manager at Anchorage for the bureau.

The city already has committed itself for some $96,000 in engineering and other contracts for the plant, for which plans were being prepared by Burns & McDonneell Co. of Kansas City, Mo.

Morgan is reported to have told Anchorage officials they can get power from the Eklutna hydroelectric project, now under construction, at a cost of some eight mills per kwh for firm power and six mills for interruptible power. Cost of power from the proposed steam plant is estimated at 2.5c.

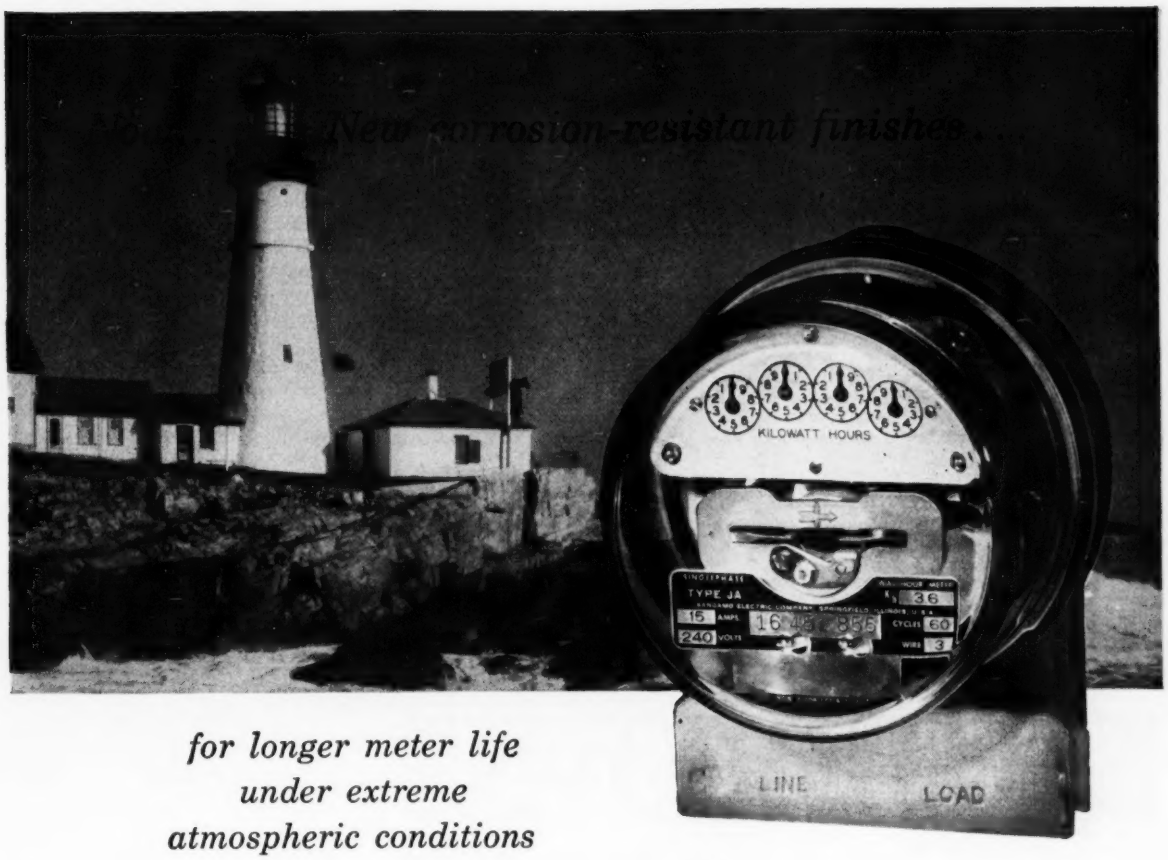
At the time Anchorage first decided to build the steam plant, the city was unable to receive any assurance of an adequate power supply from the bureau.

Westerner Sets New Record In Kwh Generation Contest

By placing second this year after having won the contest last year, I. C. Steele, retired vice-president and chief engineer of Pacific Gas and Electric, has set a new record in the annual U. S. kilowatt-hour generation contest sponsored each year by R. M. Hatfield, Pacific Coast vice-president for Combustion Engineering - Superheater Inc.

The contest for the closest estimate of the 1952 generation as published in the annual statistical issue of *Electrical World* was won by N. Knowles Davis, chief engineer of Georgia Public Service Commission, with a guess of 399,399,000,000 kwh against the published total of 399,374,000,000. Cleve Steele in second place had an error of 0.01% against the winner's 0.006%.

More than 50 Far Westerners participated in the 1952 pool and only one qualified. In the eight years since the pool started only three Westerners have ever qualified, i.e., been among the top eight. They were Noel Hinson, vice-president and executive engineer, Southern California Edison Co., his secretary, Miss Mary Thorpe, and Henry Sargent, president, Arizona Public Service Co.



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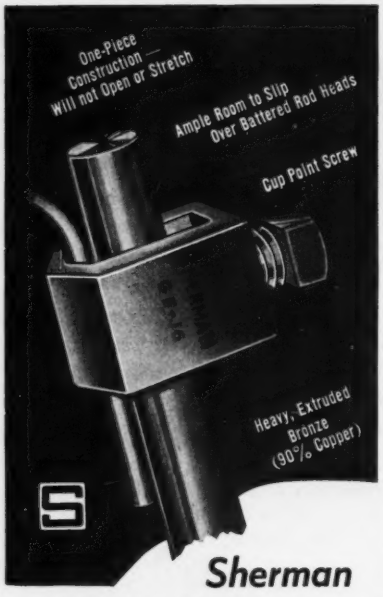
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NEWS ABOUT PEOPLE

● **Resignation** of **H. H. Farrar** as president and appointment of **J. K. Horton** to succeed him was announced by Coast Counties Gas & Electric Co. Farrar will devote his time to duties as vice-president of the parent firm, Pacific Public Service Co. Horton went with Coast Counties in November 1944 as secretary and legal counsel, was made executive vice-president in March 1951. Before employment with the power company, he had practiced law in San Francisco. Horton is also president of Pacific Public Service.

Bash

● **Frank C. Bash** has been appointed treasurer and vice-president of California Oregon Power Co. to succeed **Morey D. Field,** who has resigned after 30 years of service. A native of Seattle, Bash was graduated from University of Washington in 1929. He joined the power company before his graduation on transmission line construction. He later handled accounting on various company projects and in 1946 was made assistant treasurer. Field, who resigned because of ill health, was named treasurer in 1928, a vice-president in 1931 and a director in 1932.

● **Edward M. Naughton,** assistant general manager of Utah Power & Light Co., is on leave from the company until April to act as director of the engine and turbine division of NPA in Washington, D. C.

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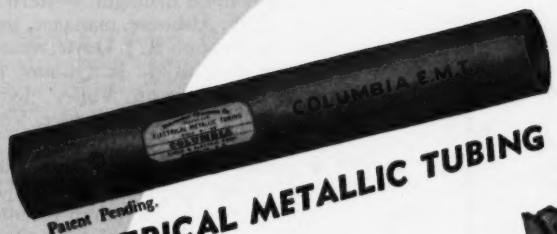

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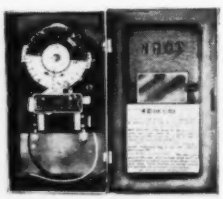

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● **George N. Hawley,** vice-president of Southern California Edison Co. in charge of the commercial department, has announced appointments to the department's general office staff. **Henry C. Rice,** former sales manager, is now director of sales; **Howard Hayes,** former advertising manager, director of advertising and publicity; **A. L. Code,** former manager of credit and claims departments, director of claims and commercial services; **W. C. Drewry,** former commercial supervisor, supervisor of tariff application. **John H. Mead,** assistant vice-president, commercial department, announced the following changes: **H. V. Busby** was appointed manager, western division; **A. W. Althouse,** manager, metropolitan division; **R. J. Doyle,** manager, eastern division; **L. R. Quinby,** manager, San Joaquin Valley division; **James Rae,** district manager, Visalia.

● **James L. McCarthy** closed a 48-year career with Westinghouse Electric Corp. when he retired recently as engineering and service department representative at the Pearl Harbor Navy Yard. He will return to his home in Glendale, Calif. McCarthy went to the Hawaiian Islands in June 1941 and earned a distinguished service commendation from the Navy for "untiring efforts" during World War II. He also was voted the Westinghouse Order of Merit, highest honorary award his company can bestow for outstanding service by employees.

● **D. D. Moffatt Jr.** has been named to the newly created post of assistant to the president of Utah Power & Light Co. Moffatt has been with the company since his graduation from University of California in 1929; has served in personnel and sales capacities and in engineering and administrative positions. Most recently he had been assistant to J. A. Hale, vice-president.

● **W. J. Varley,** manager of San Francisco Electrical Contractors Assn., for many years has served as a director of the Golden Gate Bridge district. Upon his retirement from the board, Dec. 1, the board of directors presented him with an engraved certificate of appreciation signed by Mayor Robinson and Dewey Mead of the city of San Francisco.

● **Ralph W. Seely** has been appointed vice-president and general manager of the Consolidated Western Steel Division of United States Steel Corp. He will be responsible for all operations of the division under direction of President Alden G. Roach.

DEATHS

● **Joseph C. Hobrecht,** 76, electrical contractor, died Jan. 7 in Sacramento, Calif. A native of Germany, he had moved to Sacramento from Omaha, Neb., more than 50 years ago. He first entered business by operating an electrical shop and in 1927 he started the contracting firm. He had taken little part in the business for the last several years because of poor health. Mr. Hobrecht was associated with *The Sacramento Bee* in establishing the first commercial radio station in Sacramento in 1921. The transmitter for the station was manufactured in his shop.

● **Royal E. Frickey,** 73, retired electrical research engineer, died in San Francisco Dec. 27. A graduate of the University of California in 1906, Mr. Frickey was for many years associated with Morrison-Knudsen Co. in San Francisco and with the Teleweld Co. of Chicago. He did extensive development work with electrical equipment for the construction industry, and invented welding equipment and apparatus used for heat-treating and cutting rails.

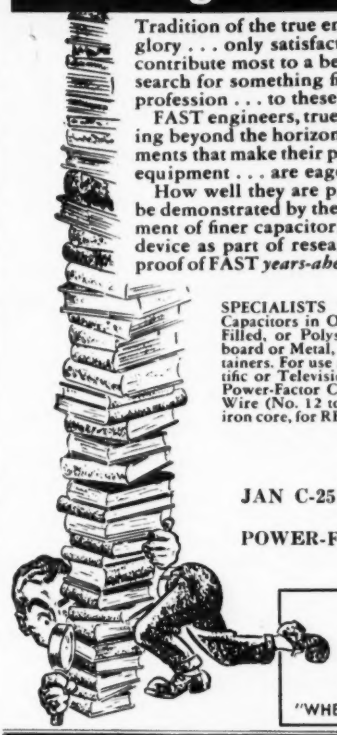
● **Tone R. Gray,** retired some years ago from Pacific Telephone & Telegraph Co. and a member of its Pioneer Society, died last month in San Francisco. Since retirement, he has taught at Heald Engineering School, been active in numerous associations, was president of the Northern California Electrical Maintenance Engineers, California Society of Professional Engineers' executive committeeman.

● **Lorne R. McPhee,** branch manager for B. C. Electric at Chilliwack, B. C., died recently. He had 35 years' service with the company, starting at the age of 15 in Abbotsford.

● **Frank M. Mason,** 42, vice-president of U. S. Electrical Motors Inc., and a former Westerner, died recently of a heart attack. He was general manager of the company's Atlantic plant in Milford, Conn. Prior to the erection of that plant in 1940, he was assistant chief engineer of the U. S. Motors Pacific plant in Los Angeles.

● **C. Wesley Howard,** 52, senior substation operator for City Light at Seattle, died Dec. 26. He joined the department before his graduation from the University of Washington in 1923.

Getting to the bottom of things



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**See HERMAN E. SEEMANN, PHYSICIST, KODAK RESEARCH LABORATORIES. "Miscellaneous Applications of Radiography and Fluoroscopy." Symposium on Radiography and X-Ray Diffraction Methods, American Society for Testing Materials, Philadelphia, Pa. (1937).*

AVAILABLE LITERATURE
JAN C-25 APPROVED CAPACITORS:
Refer to Jan C-25, "Specifications."
POWER-FACTOR CORRECTION CAPACITORS:
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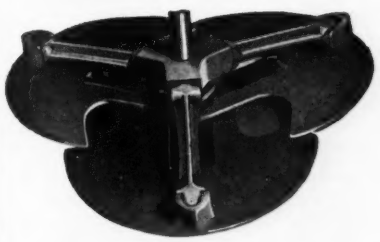

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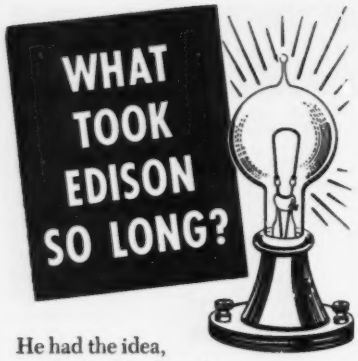

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NOTES ON THE TRADE

● **Construction** of 66,000-kw steam turbines, larger than any built previously in the West, is underway at the Westinghouse Sunnyvale, Calif., plant. Each of the 31-ft, 207-ton turbines will drive a generator capable of supplying the electrical needs of 165,000 homes. Largest turbines manufactured previously in the West have been 12,500-kw machines.

● **Standard Wire & Cable** Co. has been appointed southern California distributor of electrical wire and cable produced by the American Steel & Wire Division, United States Steel Corp. and of Hitemp Wires Inc., manufacturers of Teflon insulated wires. Standard Wire & Cable, founded seven years ago, moved recently to larger quarters at 3440 Overland Ave., Los Angeles.

● **Westinghouse Electric Supply** Co. moved to new and larger quarters at 318 S. Capitol Blvd., Boise, where all warehousing offices and display can be concentrated in one building. Spurtrack facilities and more parking space for customers are added advantages. Former location was 710 Front St., just around the corner.

● **Columbia Cable & Electric** Corp., Brooklyn, N. Y., manufacturers of armored cable and electrical conduit, has announced appointment of Robert R. Prussia Co., 224 Harriet St., San Francisco, and Kenneth B. Schumann Co., 1073 Galapago St., Denver, as sales representatives in their territories.

● **W. H. Eddy Electric Products** Inc., agents for Kuhlman Electric Co. in Phoenix, Ariz., has opened a branch office in Albuquerque, N. M., under the management of **Carl H. Johnson,** 213 Wellesley Drive, S. E.

● **Sales Engineers** Co., Kuhlman agents in Denver, has opened a branch in Salt Lake City, headed by **Russell Buchanan,** 135 S. Third East St.

● **Valley Equipment & Supply,** 439½ S. Victory Blvd., Burbank, Calif., has been named a distributor for Allis-Chalmers motors, controls, transformers and Texrope drive equipment. **R. M. Kauffman** is president of the supply firm.

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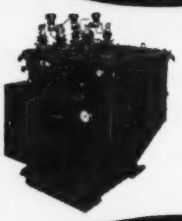

20.8 Kva, 2400 Volts through 750 Kva, 13,800 Volts

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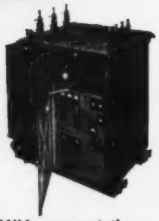
1000 Kva through 3000 Kva, 12,000 Volts through 34,500 Volts Primary



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with headquarters in Denver or Salt Lake City, for Mountain States territory by well-known electrical manufacturer with national distribution thru the wholesale trade. Established line, well-diversified, requires man or organization with supply rather than equipment background. Reply with COMPLETE details of experience, territory covered, personnel, and present lines handled. Address, President, Box 270, c/o Electrical West, 68 Post St., San Francisco 4, Calif.

ARTERIES FOR ELECTRICITY—THE *Heart-Beat* OF AMERICA!

For over 35 years, TRIANGLE CONDUIT & CABLE CO., INC., has provided, through its nation wide network of distributors, the arteries for electrical systems—for industry, business and the home.

When you use electricity—to make the wheels of your plant go around, to run your elevators or light your reading lamp, there's a good chance it travels through Triangle wire, cable or conduit.

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PROFILES

Clarence Bowers, president of Tri-State Supply Corp., Los Angeles and San Francisco, with Mrs. Bowers and their daughter, Beverly, pictured during a 12,000-mile industrial survey of the Latin Americas. Bowers was a member of the Los Angeles Chamber of Commerce Goodwill Tour

Leonard Miller of Hayward, left, and Joseph L. Perry of Oakland, right, are congratulated by Frank E. Boyd, president of Pacific Electric Motor, for completing 25 years of service with the company. They were given engraved silver trays at a dinner meeting

Long-time members of Pacific Electric Mfg. Corp., San Francisco, are pictured at "old-timers" night held recently to recognize the long service records of the company's senior employees and executives. Back row: H. L. Brooks, Kurt Scheel, Joseph S. Thompson, president, Rudolph Kahrau, Frederick G. Cairns, Frederick Thompson, director. Front row: William Dealtry, Howard Bettencourt, James A. Thompson, vice-president, Charles N. Atkinson, Gordon W. Kirkwood, Edward F. Sixtus, vice-president. President Thompson, whose 46 years of service tops the list, awarded 30-year pins to all the men pictured. The ceremony was attended by more than 200 who have served more than ten years

KLIXON

TRADE MARK REG. U.S. PAT. OFF.

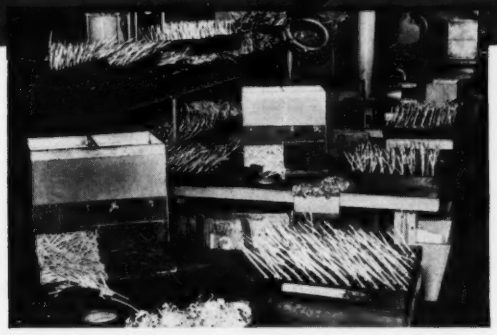
C6360

MOTOR STARTING RELAY LEADS

ARE INSULATED AND PROTECTED with

NATVAR 400

EXTRUDED PLASTIC TUBING



The KLIXON C6360 is a current type relay which means that the entire motor current flows through it. Therefore the wire in the coil winding is heavy enough to be used for leads, eliminating screw terminals. And since sleeves of Natvar 400 are reasonably low in cost, and are easily slid over the leads, assembly is quicker and less expensive. Also, leads can be color coded, because Natvar 400 is furnished in bright, distinctive colors.

KLIXON Protective devices and controls, manufactured by Spencer Thermostat Division of Metals & Controls Corporation, are used by foremost makers of refrigerating and other electrical equipment to assure safe, continuous operation under all service conditions.

Since reliability of KLIXON devices is essential, only the best materials are used. Natvar 400 extruded plastic tubing has been selected as the most suitable lead insulation for the starting relay shown above because of its excellent physical and electrical properties and its dependable uniformity.

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- Varnished silk
- Varnished special rayon
- Varnished Fiberglas cloth
- Silicone coated Fiberglas
- Varnished papers
- Slot insulation
- Varnished tubing and sleeving
- Varnished identification markers
- Lacquered tubing and sleeving
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- Extruded plastic identification markers

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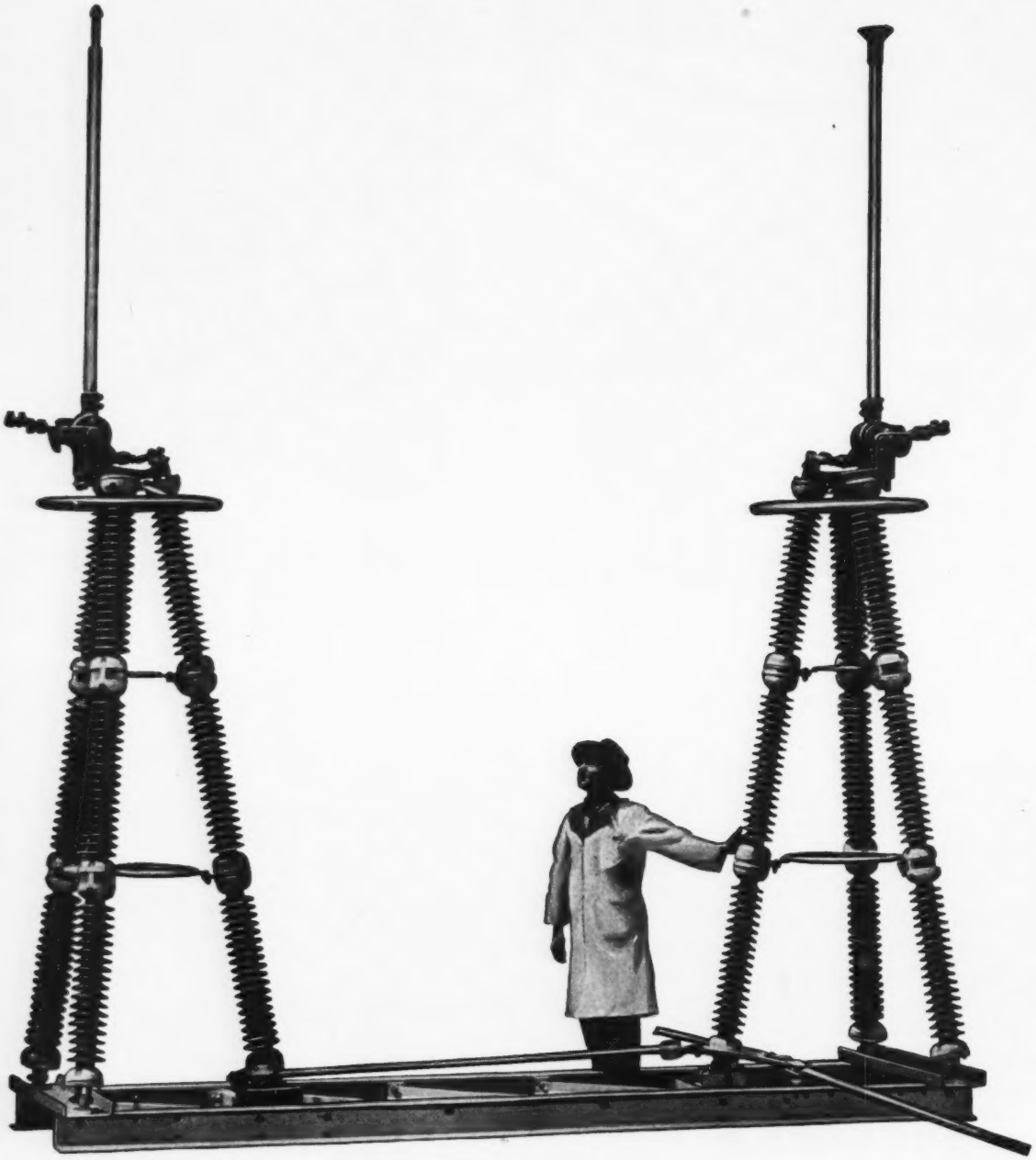

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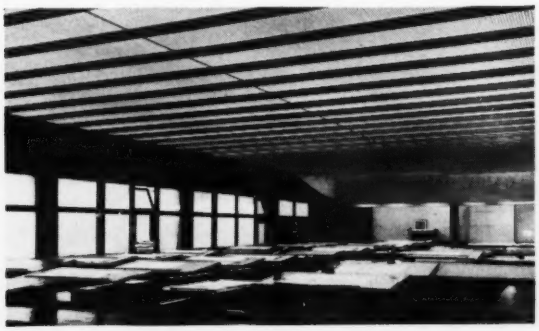

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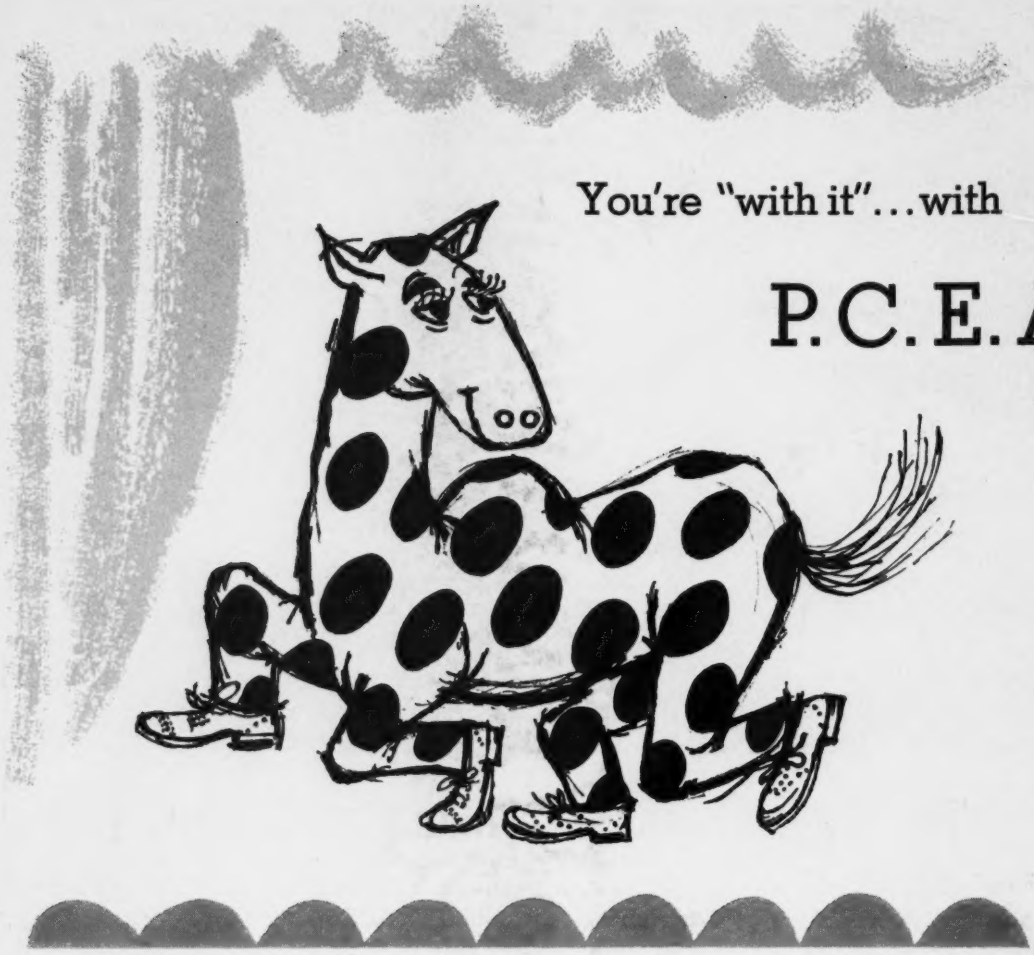

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